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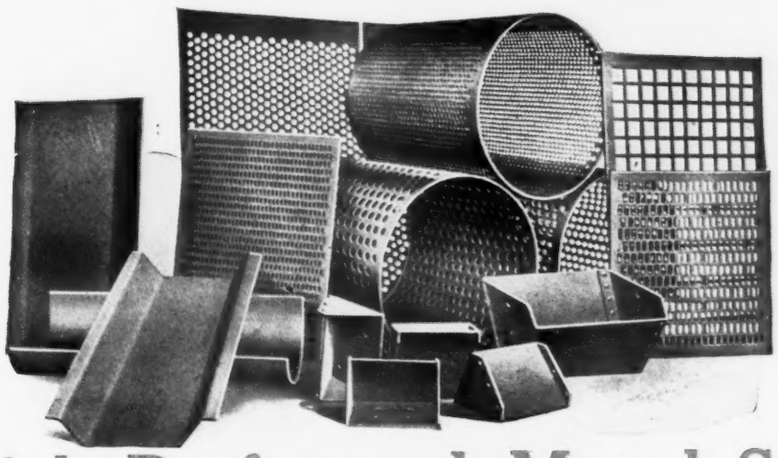

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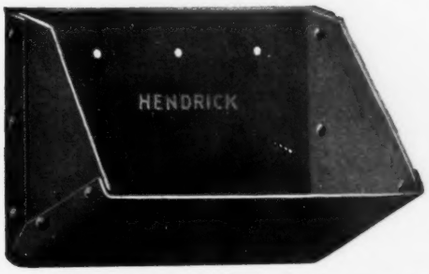


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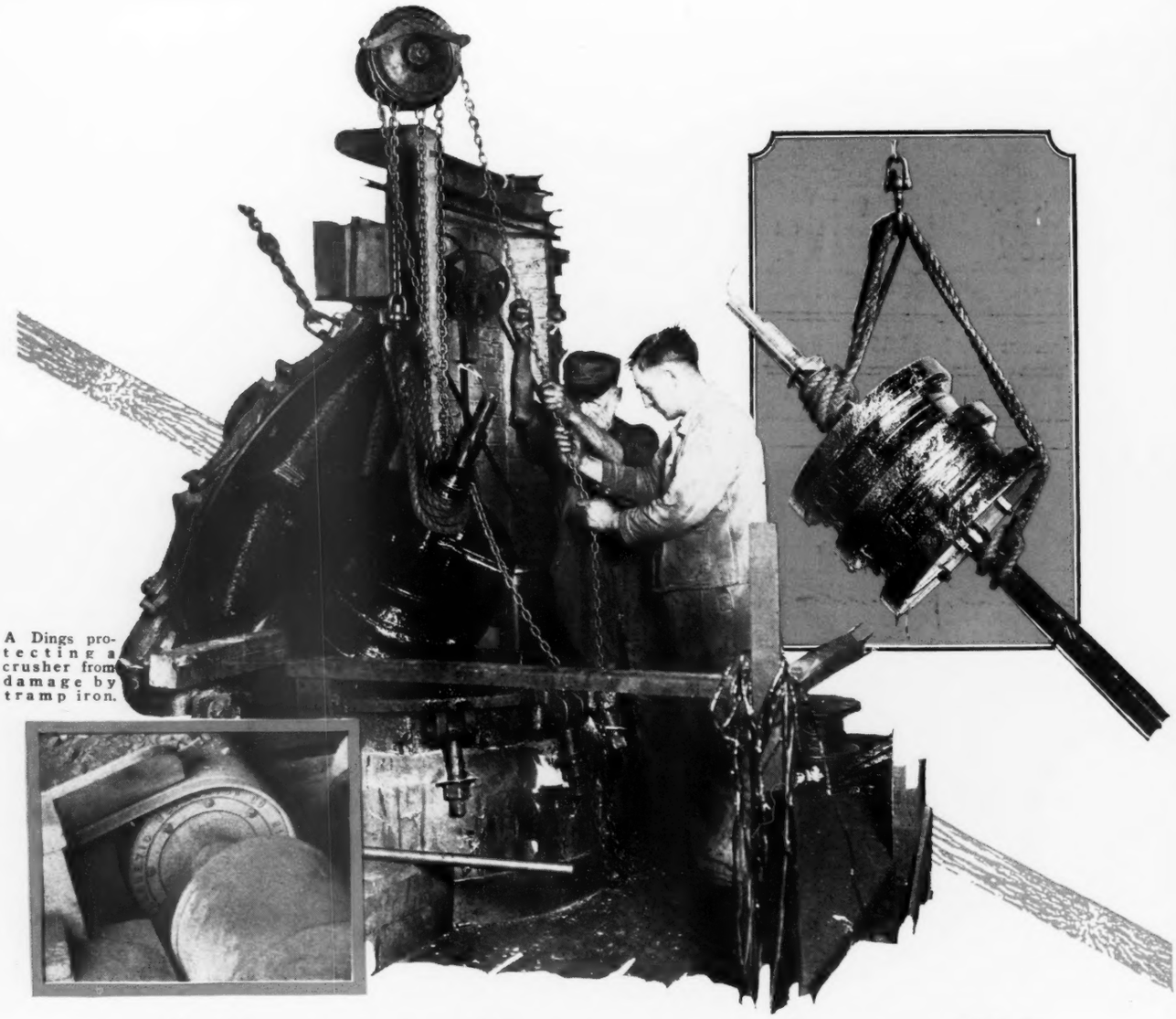

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Volume XXVIII | Chicago, January 24, 1925 | Number 2

# Convention of American Quarry Industry

## National Crushed Stone Association at Cincinnati Makes History and Progress

WHEN the members of the National Crushed Stone Association met in convention at Hotel Gibson, Cincinnati, on January 12, it was with the anticipation that this was to be not only the largest but the best convention in the history of the association. And when they left it was with the feeling that this anticipation had been fully met. Not only was the registration larger than at previous conventions but the attendance at the meetings was better, the papers more closely followed and the discussions keener. President Sloan, in his opening address, said that conventions were post graduate schools of instruction for producers and it was evident that the members and guests went to the general sessions and group meetings with that idea in mind.

It was gratifying to see the group meetings, gathered to discuss agricultural limestone, highway materials, concrete aggregate, sales, and railroad ballast, so well attended. At some of these group meetings more than 100 producers sat down to lunch and most of them remained through the long sessions that followed, lasting sometimes as late as 4 in the afternoon. The chief drawback was that one could not attend all sessions simultaneously, they were all so interesting and instructive.

*Otho M. Graves, newly elected president of the National Crushed Stone Association*

### *To Show Crushed Stone's Superiority*

Some notable papers (digests of which will be found under the various headings) were read and some important activities were decided upon for the ensuing year. One, which perhaps will prove to be the most important for the advancement of the industry, was the selection of a committee to collect and correlate the various reasons why crushed stone is to be preferred above competitive materials in the industries in which it is used. There is a plentiful amount of data to substantiate this in many reports of engineers and technical societies, in the opinion of the leaders in the crushed-stone industry. But it is scattered and hidden, and even camouflaged in come cases, so that its real value is not easily ascertained. The ordinary producer does not even know where to look for it. To bring these data together and to place them in the producer's hands, not only to arm him with a powerful sales weapon but to give him a greater respect for his product and the relation of his business to the public than he could otherwise obtain, is the aim of this new committee.

In regard to its own organization and membership, the association made important changes in its constitution. The first of these related to membership. Article III, section 2, of the constitution was changed to admit as members those who were actively engaged in selling crushed stone even though they were not producers. This was done to admit the selling agents of quarries to the privilege of membership.

On a recommendation of the rules and order committee, an amendment was added to the constution providing for five regional vice-presidents, one each from the western, central, eastern and southern states and one from Canada. This was passed to the nominating committee, who included the names of the regional vice-presidents with their nominations.

Sec. VI of the constitution was amended so as to make the board of directors consist of 25 members of the association together with the president and five regional vice-presidents, and to add two members of the board to be elected

by the associate members or the manufacturers' division. Formerly the board consisted of 19 members and the officers of the association.

### *Did Not Condemn State and Municipal Quarries*

A proposal was made to condemn the establishment of state, county and municipal quarries, and this was referred to the resolutions committee, which turned it down on the ground that this was a matter to be decided in the localities in which such quarries were to be established.

The matter of the association taking up research work was pretty thoroughly discussed at one session, the subject being introduced by a resolution coming to the convention from the sales group. This resolution pointed out that salesmen were operating under a handicap in not having available, proper and accurate evidence of the merits of crushed stone as concrete aggregate and as material for other types of construction and called for a research board to provide this and the adoption of means to finance such research.

### *Research Bureau Would Be Premature*

A lively discussion followed. But it seemed to be the conviction of the convention that the establishment of a research bureau would be premature. The resolution of the sales group was passed on to the special committee that is to collect data on the merits of crushed stone.

John Wunder (The Trap Rock Co., Minneapolis, Minn.) was officially thanked for his gift of $500 to the association, and Allen Patterson (Bluffton-Lewisburg Stone Co., Findlay, Ohio) for voluntarily tripling the membership of his company.

The committee on costs reported that not enough reports from producers had been turned in to justify any averages being made from them.

Representation on various technical societies was discussed. It was voted to secure representation if possible on all technical committes the work of which was of interest to the association. The chairman mentioned the Society of Standards and the Highway Research Board as examples. The society already is represented on two important committees of the American Society for Testing Materials and it was voted to ask for representation on the board of directors of this society.

### *Resolutions*

Many resolutions were passed. The first of these thanked the city of Cincinnati for its interest in the convention and the daily papers of the city for their reports. The Cincinnati Chamber of Commerce was also thanked. The organization of Hotel Gibson was thanked for the courtesy and service shown the members. A. R. Wilson, Watsonville, Calif., who had been prevented from attending by the illness of Mrs. Wilson, but who sent the association a redwood gavel, was thanked for this and a resolution was passed expressing the hopes of the convention for Mrs. Wilson's recovery. A wire was sent to John J. Sloan, the retiring president, who was unable to be present at the closing session of the convention, thanking him for his successful administration of the affairs of the association. The Ohio members of the association were thanked by resolution for furnishing the excellent entertainment at the annual smoker.

### *Resolution on Kelly Tariff*

The resolution regarding the proposed cancellation of the Kelly tariff was as follows:

WHEREAS, MANY shippers of crushed stone in the Central Freight Tariff Region view with concern and anxiety the proposed cancellation of Agent Kelly's Tariff No. 228, because of the probability that the joint through or proportional rates established by individual carriers' tariff in lieu thereof, would not be as comprehensive as the application of the present combination rule, resulting thereby in the interruption to trade and loss of business and that joint through or proportional rates subsequently established would be higher than contemplated by the Kelly tariff, and,

WHEREAS, THIS Association understands that both the Interstate Commerce Commission and the carriers are desirous of effecting cancellation of this tariff for reasons with which this Association is not unsympathetic, but, furthermore, understands that the cancellation of this tariff will not be permitted until and unless joint through or proportional rates are established in lieu thereof, as should be satisfactory to shipper, and that the shippers should be freely consulted to effect this end,

THEREFORE, BE IT RESOLVED that this Association respectfully ask the Commission if the understanding of this Association as herein set forth is correct as to the provisions governing the effecting of the cancellation of this tariff.

### *New Officers and Directors*

Following is a list of the officers elected to serve for the ensuing year:

President, Otho M. Graves, General Crushed Stone Co., Easton, Penn.

Regional Vice-Presidents: H. E. Bair, France Stone Co., Toledo, Ohio; Stirling Tomkins, Tomkins Cove Stone Co., Tomkins Cove, N. Y.; Norman Hely, Edward Hely Stone Co., Cape Girardeau, Mo.; Thos. McCroskey, American Limestone Co., Knoxville, Tenn.; C. M. Doolittle, Canada Crushed Stone Corporation, Ltd., Dundas, Ont.

Board of Directors: John J. Sloan, Wisconsin Granite Co., Chicago, Ill.; F. W. Schmidt, North Jersey Quarries Co., Morristown, N. J.; W. Scott Eames, New Haven Trap Rock Co., New Haven, Conn.; E. J. Krause, Columbia Quarries Co., St. Louis, Mo.; John Rice, General Crushed Stone Co., Easton, Penn.; A. J. Blair, Lake Shore Stone Co., Milwaukee, Wis.; W. H. Hoagland, Marble Cliff Quarries Co., Columbus, Ohio; W. L. Sporborg Rock-Cut Stone Co., Syracuse, N. Y.; B. D. Pierce, Jr., Connecticut Quarries Co., Bridgeport, Conn.; J. J. Sullivan, Consumers Co., Chicago, Ill.; A. R. Wilson, Granite Rock Co., Watsonville, Calif.; John Wunder, The Trap Rock Co., Minneapolis, Minn.; J. F. Schroeder, Linwood Cement Co., Davenport, Iowa; E. C. Dodson, Texas Stone Products Co., Dallas, Texas; Harry H. Brandon, Ohio Marble Co., Piqua, Ohio; R. B. Tyler, The R. B. Tyler Co., Louisville, Ky.; W. W. Boxley, W. W. Boxley Co., Roanoke, Va.; O. P. Chamberlain, Dolese and Shepard Co., Chicago, Ill.; F. C. Murphy, Brownell Improvement Co., Chicago, Ill.; J. C. King, Carbon Limestone Co., Youngstown, Ohio; G. J. Whelan, Kelley Island Lime and Transport Co., Cleveland, Ohio; Allen Patterson, Bluffton-Lewisburg Stone Co., Findlay, Ohio; P. B. Reinhold, Reinhold & Co., Pittsburgh, Penn.; H. C. Perry, Stringtown Crushed Rock Co., McAlester, Okla.; George H. Balfe, Monon Crushed Stone Co., Monon, Ind.

### *Manufacturers' Directors*

Elected to the Board of Directors of the National Association by the Manufacturers' Division: N. S. Greensfelder, Hercules Powder Co., Wilmington, Del., and S. R. Russell, E. I. du Pont de Nemours & Co., Wilmington, Del.

The other officers, A. P. Sandles, Secretary; Claude Clark, Assistant Secretary, both of Columbus, Ohio, and James Savage, Treasurer, Buffalo Crushed Stone Co., Buffalo, N. Y., were recommended to the executive committee to be retained in their present positions.

The following officers of the Manufacturers' Division were elected: President, W. E. Farrell, Easton Car and Construction Co., Easton, Penn.; Regional Vice-Presidents, G. C. Buchanan, Thos. Robins, Jr., M. B. Garber, L. W. Shugg, and Fred A Gill; Secretary-Treasurer, Nathan C. Rockwood.

### *Convention Committees*

NOMINATIONS COMMITTEE

F. W. Schmidt, Chairman; E. J. Krause, F. C. Murphy, W. Scott Eames, R. B. Tyler, H. E. Bair, N. S. Greensfelder, W. E. Farrell.

RESOLUTIONS COMMITTEE

John Rice, Chairman; R. W. Scherer, Norman Hely, P. A. Schroeder, W. L. Sporborg, Eugene R. Atwood, Edw. E. Evans, P. B. Reinhold, N. C. Rockwood, E. C. Hanson, Harold M. Munday.

RECEPTION COMMITTEE

B. T. Van Camp, Chairman; O. P. Chamberlin, E. M. Lamkin, H. H. Brandon, H. M. Sharp, Allen Patterson, H. B. Allen, James Savage, N. C. Rockwood, John Rice, W. L. Sporborg.

BANQUET AND THEATRE COMMITTEE

H. B. Allen, Chairman; J. J. Sullivan, Norman Hely, F. W. Schmidt, Jr., Harold Van Camp, E. G. Lewis, B. McGrew.

RULES AND ORDER OF PROCEDURE COMMITTEE

C. M. Doolittle, Chairman; Henry Wunder, L. J. Boxley, E. C. Dodson, Otho M. Graves, Russell Rarey, G. W. Flounders, C. G. Buchanan, H. A. Johann.

AUDITING COMMITTEE

J. Wortman, Vincent Sloan, Thomas Robbins.

COST REPORTING COMMITTEE

James Savage, N. C. Rockwood, F. T. Gucker, C. M. Hunter, O. P. Chamberlain.

# Opening Addresses

THE convention began promptly on the hour, at 10 o'clock, Monday, January 12. President Sloan introduced Judge Dennis Ryan as the "right hand man" of the Mayor or Cincinnati and the judge made a brief address of welcome.

### *Welcome to Cincinnati*

He told the members that owing to their intimate relations with public improvement projects, they had as much right to consider themselves the servants of the public as those who had received the vote of the electorate. Then he spoke of Cincinnati, of which its critics always said that it was "too conservative." Judge Ryan said that there might be some reason in the criticism but he thought that this conservatism led to beauty and a certain stability that was worth while in itself. He wanted the members to visit the suburbs and places of interest about the city and judge for themselves.

At the president's request John Rice, past-president of the association, president of the General Crushed Stone Co., Easton, Penn., replied briefly to Judge Ryan's speech and thanked him and the mayor for the invitation and cordial welcome.

## President Sloan's Address

YOURS is an honored and an honorable industry which, from the earliest times, has ever played a most important part in the welfare of human kind, and stone in one form or another, has been used, not only as a means of defense, but an aid in obtaining sustenance and shelter, and all through the affairs of life, until finally as a memorial used to perpetuate one's name and his fame.

"I have no desire to exalt the crushed-stone industry beyond its proper place in the affairs of life, but in all sincerity I submit that were it to cease its activities tonight civilization, as we know it, could not function; chaos and disorder would follow and isolation and primitiveness would result, with their attending wretchedness and misery.

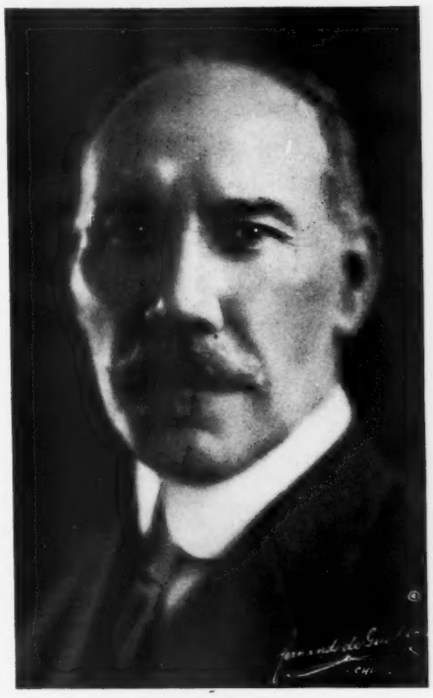
"You can be very sure that we have no intention of permitting any such catastrophe to occur and the facts are stated only to draw attention to the basic character of the industry and to prove to a more or less heedless world how essential we are to the well ordered system that governs our lives and interests.

"You can abolish one kind of food and live on another; you can abolish your usual covering and, as your ancestors did, go clothed in fig leaves and furs; you can find a substitute for all present day materials we consider so essential, but you cannot carry on our present progressive civilization without crushed stone, for nature with all her munificence has not provided a substitute for it.

"Truly, we live in an age of steel and that essential product cannot be successfully or profitably produced without our limestone.

"Truly, we live in age when transportation required for the distribution of human energy, could not function without the crushed stone producer.

"Second only in importance to others is



*President 1924-1925*

the chemical industry which makes possible greatly increased food supply and ramifies through the whole range of manufacturing, even including that of medicine, and crushed stone in one form or another is absolutely essential to life itself, either directly or indirectly.

### *A $260,000,000 Industry*

"Federal statistics indicate an investment of $260,000,000 in our industry, producing approximately 100,000,000 tons annually and furnishing direct employment to 200,000 persons.

"The importance of the industry has grown with the year and it has been showing a steadily increasing output averaging about 10% for the last few years. Its growth and volume have been such that (since the organization of the National Crushed Stone Association) transportation companies and others have awakened to the measure of its importance, with the result that greater consideration, not only in tariffs, but in the movement of commodities and the equipment to handle them, have engaged the earnest attention of railway officers, with the result that during the past year very few complaints relative to public carriers have been heard.

### *Beginning of the Association*

"The organization of the Association dates from the dark and bloody days of the great war when, in January, 1917, in the city of Columbus, a handful of earnest, devoted operators gathered together to see what might be done toward enabling the industry to continue wtih the many restrictions, as well as demands, made by the necessity of war. And, as I look back upon the efforts made by our former presidents from Blair to Rice, and Rice to Krause, and Krause to Eames, and Eames to Schmidt, our president a year ago, I am impressed with the thought and the energy that they each in turn expended in the development and bettering of the association for the common interests of all and I take this opportunity of paying my tribute to them and many others, representing scores of companies whose officers were all concerned in convention work. And I am satisfied that as they look back on it, they have the consciousness, not only of duty well performed, but of financial returns, by reason of the association's efforts, that in the prosperity the industry has achieved, they have had their full measure of it.

"That we have grown and that our importance has increased is evidenced by the organization of our auxiliary association of manufacturers who provide us with the necessary equipment and enable us to meet present day demands and it is pleasing to acknowledge their very material help and assistance, as well as their displays of recent years which have been an education and source of knowledge to us all.

### *The Trade Publications*

"Lastly, the trade publications and their personnel who have been first and foremost in every effort to better and raise the industry to a higher standard, who by advice and kindly suggestion have aided in a higher standard and higher ethics amongst all producers and who by the dissemination of information and knowledge have kept all producers, whether members of the association or not, fully advised as to what was going on, have been a tremendously important factor in our growth.

"With their descriptions of technical devices; potential market values and prices, they have enabled comparable standards to be established the country over that in most instances have been of great value, and a

direct guide to the policy of many a producer, so that our thanks are in a special manner due to our various trade papers and their respective staffs, who deserve from the industry all the appreciation that you can bestow upon them.

"During the past year your officers have diligently sought to protect and advance your interests in every way, especially in important matters of tariffs and their relation to other commodities. Members of the railroad committee have repeatedly attended sessions in Washington, where our requests and suggestions have been given most courteous consideration. Chairmen of many committees have diligently attended to their respective duties and the fruit of their work will be spread before you as our convention goes on so that you may profit as a result of their efforts. Additional membership has been gained during the year and there is every prospect of increased membership during the coming year.

"With a building program estimated by the F. W. Dodge Co. of over $5,000,000,000 to be spent in 1925, a road program in the various states, counties, and municipalities well in excess of $2,000,000,000; with railroads contemplating the expenditure of another $1,000,000,000, due to greatest freight movement in history, with the steel industry operating at 90% capacity, the highest since war times; with the most prosperous farming communities that we have seen in the seven years past, with money more plentiful and the lowest interest rates ever before in history; with a definite policy of government assured for the next four years; with a healthy and contented people and a world clamoring for many of the nation's products, there is every reason to believe that 1925 should be one of the best and most prosperous years in history.

***Prosperity for Crushed Stone***

"That the crushed stone industry will share in this prosperity is fundamental, because of the basic character of our product; and it only remains that we take counsel together, adopt the best and most economical methods of production, observe the standards and ethics of the trade and in producing our product according to the necessities and demands upon us, that we do it in a manner that shall be above criticism and that will give service and full value for whatever our charges are.

"Separately each of us may go our way and possibly prosper; collectively and unitedly we stand as a force that will secure the attention of legislative bodies everywhere, of public agencies anywhere, and by acting together we can defend ourselves against inimical legislation, protect our rights and insure the respect and attention of the people to any reasonable and just demands we may make.

"Take part in all the various group meetings and sessions of this convention for, in its last analysis, it is a post-graduate course in your business, and here, by direct contact, you have an opportunity to meet men of many minds; obtain the views and learn the standpoint of men who have made the industry a success and, although you spend thousands, with months of travel, you never could get the personal contact; the advice or knowledge or information that I am sure every member present will gladly extend to each other.

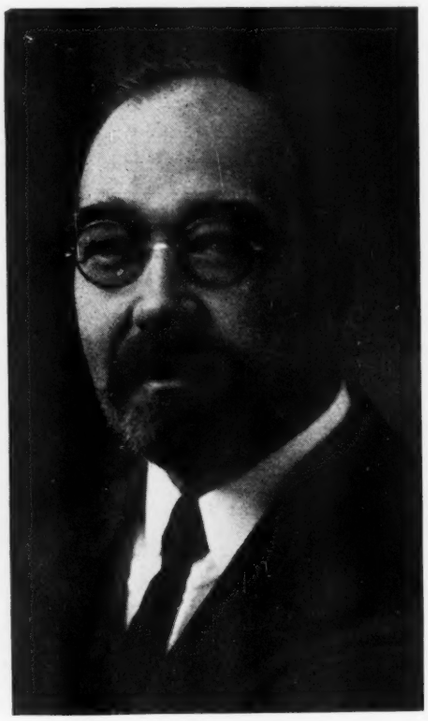
"Organization today is a necessity in any line of industry that is worthy of being called a business and—with no selfish interests to serve—we extend the hand of fellowship to all of you, trusting that your days here may be pleasant and profitable and that our efforts to advance the welfare of the association will meet with a hearty response from all of you, for in helping it to that extent you are only helping yourselves.

"Governments come and go; officials are in and out of office, but industry on which men live goes on forever—and it should be our endeavor to constantly seek for new blood and efficient blood, which can be trained and developed into assuming responsibilities, not only of our particular industry, but associations such as these, for when your national associations are well managed with definite standards and set a pace for progress and prosperity it becomes a guiding star to the men in that line and an inspiration as well as a protection for all concerned.

"We want your aid and your advice and, particularly, we want your good will. We are but human, trying to do the best we know, and it will be a pleasure as the convention carries on to have every member take a part and do his part so that the time we spend here will be of the greatest possible benefit to all of us."

# Directors Report—Outlook for '25

***NEW JERSEY.*** F. W. Schmidt (Norristown, N. J.): This has been a good year. The season opened slow but "wound up with bells on, with the highway engineers calling for material in bunches." Labor conditions were good and the car situation



*President 1923-1924*

was satisfactory. There is an excellent outlook for 1925.

***New York and New England.*** W. Scott Eames (vice-president and general manager, New Haven Trap Rock Co.): The stone producers of New England and Greater New York as a whole had a very successful season this past year. The loss of one of the large Hudson river plants, which was destroyed by fire early in the season, was expected to create a shortage in this market. Owing to the improvement in the other plants during the previous winter, this shortage was overcome. Productions were much greater in 1924 than in 1923.

He was optimistic as to business conditions for the stone industry in 1925, and the general impression and sentiment now prevailing, is that it will be a very successful season. The low money rate and easy money, the increased earning power of the railroads, and, also the increase in farm products and in the iron and steel trade, show that all lines of trade are vastly improved.

In New York City the subway work and port development are expected to start during this year. Industrial building, as well as important public works are starting the winter and much is in sight for next spring. It will be a benefit to the stone producers if a large amount of this work comes out early in the season. During the year 1924 the highway construction work in the state of Connecticut was almost double of that of any previous year. There is a large program for the next two years, if money is available. Crushed stone is sold at prices at least 20% higher in other parts of the country than in New England. In the coming year the stone industry is likely to be more stabilized and better prices may be realized.

In this section of the country, producers had hoped that the immigration laws would be modified in such a way as to let in sufficient labor to help our industry. It is now realized that before any more are let in, the present large population will have to become

more Americanized and understand our institutions better. At the present time the majority of people in the United States is absolutely opposed to letting down the bars on immigration, making it necessary to get along the best we can, under these conditions. As our industries increase labor will naturally be absorbed, and labor costs will be higher. It is the sense of public opinion that it is much better to have these conditions, than to have a large increase in the foreign population, which has been steadily flocking in during the last dozen years or so.

It is estimated that about 15,000,000 automobiles and trucks are using our highways yearly, and, it is conceded that 4,000,000 new autos of all descriptions are turned out every year. With this large number of automobiles and trucks in use, and the amount growing daily, the owners of these cars are demanding much better improved roads, and a few of the Eastern states are now taxing gasoline to help build highways. In Connecticut, the last two years, this gasoline tax raised $2,000,000. This was also used in highway work. The states are now demanding laws to restrict

*President 1922-1923*

not only trucks, but also the busses which use our highways, nevertheless, the demand is for heavier, more permanent, and wider trunk line highways. With all the foreign trucks and busses coming and going from one state to another, there is a demand that they should be taxed, not only to protect our present highways, but also to furnish funds to help build new ones. It is not fair and reasonable to expect the different states to spend a large amount of money, and allow such an extremely low tax on these foreign trucks and busses that use the present highways.

The betterments and improvements installed at the New Haven Trap Rock Company's plant during the winter of 1923-1924, increased production about 138,000 tons in the past year. We were able to dispose of this large production—a total of 750,000 tons—and we feel that the coming year will be a very successful one.

With the improvement in the construction of concrete roads and their increased demand, crushed stone faces the competition of local and imported gravels. This association would do well to carry out tests to show the superior bond of crushed stone even in concrete and to collect and disseminate all knowledge and facts gleaned in the various states which prove the superiority of crushed stone.

***Eastern Pennsylvania and Southern New York.*** John Rice (president, General Crushed Stone Co., Easton, Penn.): The road program was slow in Pennsylvania, but the season was long. There was a 10% increase in road building which was more active in Pennsylvania, and much activity is promised for 1925. The outlook for general business in 1925 is optimistic, but there is some concern as to labor supply.

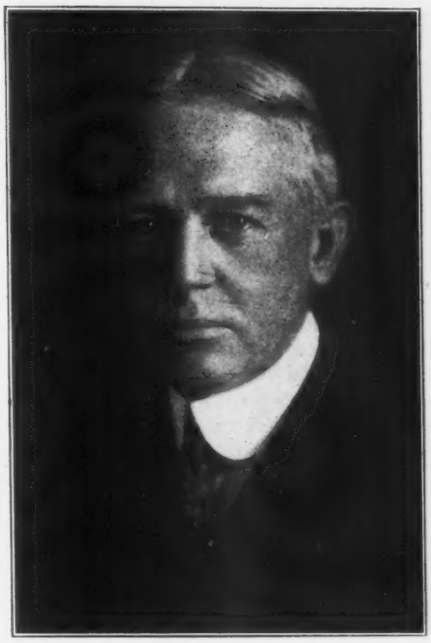
The speaker recommended an early start in the season's industry and especial attention to car service rules. He wanted producers to keep in harmony with the regional railroad traffic committees and to answer all their questionnaires promptly.

***Northwest and Central New York.*** W. L. Sporborg, (president, Rock-Cut Stone Co., Syracuse, N. Y.): The year 1924 was a good year in its ultimate output. The section was probably long on productive capacity. There was not much increase in highway work. In his opinion there was "too much stone."

"Can there be too much of a good thing?" asked President Sloan amid laughter.

***Chicago District.*** John J. Sullivan (Consumers Co., Chicago): There were seven quarries in the Chicago district which in the past year produced 4,550,000 tons of limestone. Of this, in round numbers, 726,000 tons were used on Chicago's streets, 500,000 tons was flux used by the steel companies and foundries, 120,000 tons were shipped as agricultural limestone to the farms of Illinois, 450,000 tons were used as railway ballast, 1,362,000 tons were used in construction in Chicago and 1,392,000 tons in construction outside of Chicago. In addition to this 2,500,000 tons of Michigan calcite limestone were brought into Chicago from outside the district. Building permits in the city were now over $296,800,000. There was a good labor situation and good car supply. There were excellent prospects for 1925 with more than $100,000,000 ready to be spent in Chicago and the $100,000,000 bond issue in Illinois for roads. All the producers in the Chicago district made money although the competition from gravel was heavy and producers were kept busy bucking it.

***Missouri.*** Norman Hely (president, Edward Hely Stone Co., Cape Girardeau, Mo.): In Missouri and Arkansas the demand for crushed stone was good and the ballast program was exceptionally good. The



*President 1920-1921*

railroads have been allowed to run down. There is a good deal of street paving but not so much road work as you might think. Small towns, those with 5000 population and more, are paving their streets. The demand for agstone is increasing in the state.

The labor situation has been satisfactory and the railroad service exceptionally good. Cars were not too plentiful but the supply was adequate. The Missouri state highway department has $100,000,000 to spend on roads. The auto license fees have been increased 50% and a 2-cent tax has been placed on gasoline. The state is still in the mud. Most of the roads are the old-fashioned dirt roads with a high crown, off of which a car will slide when it is the least bit muddy. Bridges and culverts are being rebuilt. Hard surface roads are being built on the main lines of travel and about $7,000,000 worth of contracts were let recently.

The speaker was sorry to say that the Missouri highway department had not yet

found out that the best material was the cheapest. The gravel specifications were very broad and the department was in this way asking for cheap material. The state had a very low freight rate which applied only to highway materials and the effect of this low rate should be the purchase of more material from established producers. The producers of the state were hoping for a lot of business eventually to replace cheap, wayside pit material.

In commenting on this President Sloan spoke of the complete collapse of the Wisconsin highway program which came about through the use of poor pit gravel. He thought that Missouri should take a lesson from this.

***Canada.*** C. M. Doolittle, (president, Canada Crushed Stone Corporation, Ltd. Dundas, Ont.) Mr. Doolittle spoke principally of safety work in his section, and his paper will be found on another page.

***Central and Northwestern Indiana, Southeastern Michigan and Western and Northeastern Ohio.*** H. E. Bair, (general manager, France Stone Co., Toledo, Ohio):

The demand in 1924 for commercial stone was the greatest in the history of the business. At the same time the market price level was irregular, accounted for by the sale of a considerable by-product tonnage in this market from the lime and furnace plants, as business was temporarily slackened during the forepart of the season, also by adverse weather conditions early in the year and disappointment on the part of ballast producers in not experiencing a normal movement. This caused an abnormal load for this line of business to carry and made it impossible to anticipate the favorable market conditions we all enjoyed the latter part of the year. The demand for stone being considered on the increase in all chemical lines, such as cement manufacture, furnace operations, etc., and considering the plans being made by the railroads for ballasting, it is anticipated that the season of 1925 will bring about a stability of prices as well as a demand for tonnage in this market, the equal of or greater than that of 1924.

RAILROAD BALLAST—At the beginning of the year 1924 the railroads all had the use of more than the normal amount of ballast planned, but adverse business and political outlook caused several boards of directors of various lines to curtail expenses, the result being that the demand for the ballast in this section was at least 35% below normal. The price level was not affected, however. Basing our opinion on present business conditions, the final clearing of the air as to the government's position affecting business and the plans various railroads now have for improvements in 1925, it is anticipated that the demand for ballast will be the equal of or greater than any other year in the business. The general price level, however, will not be affected by this, as the present ballast prices are fair when considered from a cost standpoint and the relative position this price bears to the level of commercial and stone sold for other purposes.

CHEMICAL AND FURNACE USES—The experience of produers in this field in 1924, particularly for the first three-quarters, proved they were probably the hardest hit of any class in the business. The demand, the total of which was less than at any time in the history of the business, taking into consideration increased production facilities provided for to meet the demands during the preceding year. The price level, particularly for furnace use, was the lowest in years, the same factor that caused a general falling off in demand for railroad ballast affecting this business along with the over-stocking at the point of consumption. The last quarter of 1924 showed a general improvement, and at present, basing the predictions upon plans consumers now have for their operations, producers in this field can at least look for a normal demand with a noticeable stiffening in the price level, but not to the level to which this business is entitled. In making this prediction, consideration was given to the increased production recently provided for in this line.

A. E. Bair

***Regional Vice-President***

PRODUCTION AND OPERATION—The common labor supply was sufficient and efficient and at wages fair to both the employee and employer. Material prices, such as coal, dynamite, repairs, equipment, etc., were on an average lower than in 1923, but this is probably a temporary condition brought about for the purpose of working off excess stocks, etc. It is anticipated that all such prices will be increased, not abnormally, however. There were no large plant installations made in 1924, but several plant and equipment changes at the old locations were made to increase efficiency and reduce the labor factor to a minimum, and to improve the preparation of the product, such as by sizing and screening, etc., to raise limestone to a standard not attained by other aggregates or above a standard which at least limits their field of usefulness. In view of increased industrial activity labor will be scarcer, naturally, and probably at some small advance in wages. Increased production should partly overcome the latter item. We don't anticipate a shortage sufficient to seriously affect production. There was considerable slack left over in the demand for 1924, which will act as a reserve for 1925 and along with continued increase in efficiency in management, we believe that we will suffer no hardships.

RAILROAD SERVICE AND RATES—The car supply was plentiful and with increased railroad facilities in this district, no serious trouble is anticipated for 1925. There were no general rate reductions. The railroads all showed a willingness to adjust individual rates when necessary. There is no necessity for asking for a lower rate level except to meet local conditions, but we are willing to forego this business as long as the railroads require the present rates to fully cover their costs and enjoy a fair profit.

***Minnesota.*** Harvey Wunder, (The Trap Rock Co., Minneapolis, Minn.): The main thing needed in this district is money, as the legislature did not pass a proposed $20,000,000 bond issue and all the money that can be spent on highways is 20% of the automobile license fees, which totals $6,000,000. The legislature is now in session and it remains to be seen what it will do to improve matters. The counties want to bond themselves to raise highway funds and have the amount returned by the legislature. Commercial business was fair; there were no labor difficulties and the car situation was good.

***Texas.*** E. C. Dodson, (president, Texas Stone Products Co., Dallas, Texas): Texas expects to spend a large sum on roads, but there is a disposition to use gravel in places where stone would not cost 10% more. The association should take this up. The association should also take up the matter of car demurrage.

***Western Ohio.*** Harry H. Brandon, (Ohio Marble Co., Piqua, Ohio): On account of the poor demand for flux stone, the flux producers found it hard to get work enough to do to hold their organization together. However, demand is increasing and the prospects for 1925 are good.

***Western Pennsylvania.*** J. C. King, (Carbon Limeetone Co., Youngstown, Ohio): The production of the district was between 3,500,000 and 3,000,000 tons in 1924, including flux stone, road stone and agstone. The district has no competition from gravel but there is strong competition from slag. Pennsylvania does not permit

slag in its concrete roads, but Ohio does, and hence sales in Ohio have to be made against that competition. There is "steel money" back of slag, the steel makers being anxious to see slag sold as this saves the cost of disposal in other ways. Hence all stone placed in Ohio requires sales effort and the producers are working together to sell it that way.

Pennsylvania has a $50,000,000 road program, and as slag is absolutely prohibited, sales were good. The main production in Hillsville district is flux stone, next road stone, and agstone is produced from screenings. The speaker's plant produced about 1,000,000 tons, but the plant burned down while they were shipping more than 100 cars a day and they had to buy in the open market to fill highway contracts. The speaker felt, however, that while they might have lost business by doing this, he was glad to say that they made many friends.

President Sloan wanted to know what arguments had been used to convince the Pennsylvania highway department that stone was better than slag for highway purpose. Mr. King said that it wasn't a case for argument. A comparison between concrete pavements made with slag, and stone, which had lasted for a 10-year period, showed conclusively that stone was the better aggregate.

***Wisconsin.*** R. W. Scherer, (Western Lime & Cement Co., Milwaukee, Wis.), said he was sorry he could not add to the general note of optimism. There was only a small road program in Wisconsin in 1924, and the program will be small in 1925. The gravel producers could cut prices from 60 cents easier than the stone producers can cut from $1. Hence there was marketed only smalls from lime production, which were quite an item. In the general construction line the producers are looking forward to a good season. He was trying to promote the sale of stone on its own merits and through statewide activity; and impartial tests are required to determine that it is the best concrete aggregate.

The stone producers in the speaker's section hope that the highway department will permit such preferential mixtures, as say, 1-2-4 for crushed stone and 1-2-3½ for gravel. The difference in the cement content then would be enough to give crushed stone the preference. As the road program is increased the producers can look for increased busines.

***Kentucky.*** R. B. Tyler, (president, The R. B. Tyler Co., Louisville, Ky.): Business in Kentucky has been fairly good. But there is limestone all over the state and small quarries which crush for local use are most active. There are 8 or 10 regular producing plants in the state and these have done a good business. But the prospects for 1925 are not so good. The highway department is out of funds and the railroads are not using much stone.

(President Sloan remarked that the speaker had given the association just the kind of information that it needed.)

#### *Reports From Trade Papers*

*Rock Products.* Nathan C. Rockwood said an investigation covering the whole country had been made both by questionnaires and through the observations made by the editors in visiting various parts of the United States. The dominant thought seemed to be that more attention should be paid to decreasing costs rather than increasing production, and investment should be made with that end in view. No one expected to see

C. M. Woolett

***Regional Vice-President***

lower wages, and the fact that the possibility of decreasing costs without lowering wages was conceded made this conclusion significant.

*Cement Mill and Quarry.* E. S. Hanson referred to the address of Robert H. Ford, chief engineer of the Rock Island Lines, before the National Sand and Gravel Association at Chicago the week before, in which it was stated that 35,000,000 tons of ballast would be used by the railroads this year. He thought that a good prospect for 1925. As to road programs he had noted that while these had been decreased in some states they had been increased in others so that the balance would probably be maintained throughout the country.

*Pit and Quarry.* H. W. Munday said that his paper's questionnaires were answered in a less optimistic tone from the South than from other parts of the country. Canadian producers reported that highway departments in Canada favored crushed stone. One producer who had answered a questionnaire said that he hoped road programs would come gradually and not in one lump, as the Illinois program had come. Producers seemed to think that competition would come about by cutting costs rather than by cutting prices.

#### *Manufacturer's Reports*

*Explosives.* N. S. Greensfelder, (Hercules Powder Co., Wilmington, Del.), said he had had the privilege of working with Harry H. Brandon in the use of pulverized limestone in the coal industry. He explained something of the use of pulverized limestone both for "dusting" and stemming holes and said that Mr. Brandon had collected a lot of valuable data. Reference was made to an article on the subject in the *Explosives Engineer.* Production of pulverized limestone, Mr. Greensfelder said, is feasible only by regular stone producers. If a coal mine should put in its own plant the plant would be idle the greater part of the time.

Mr. Greensfelder said in closing: "On behalf of the Manufacturers' Division of this association, of which I have the honor to be chairman, I want to express my appreciation for the co-operation we have had from your directors."

*Manufacturers' Division.* W. E. Farrell (president, Easton Car and Construction Co., Easton, Penn.), thanked the association for allowing the members of the division to come into the meetings and for giving the manufacturers representation on the board of directors. He said that he wanted the members to make comments—even antagonistic comments—on the equipment shown, for he thought the great advantage of the convention to the manufacturers was that they could hear what the members had to say and then go home and make a better product.

#### *President Sloan Sees Much Greater Demand Ahead*

In commenting on the directors' reports, President Sloan said there was one factor in the situation which the reports had not touched upon. That factor is that this is a motorized age which in the very nature of things calls for roads and yet more roads. The re-elected governor of Wisconsin was placed in his office by the advocates of a program of economy, but the very people who put him there are now urging the building of more good roads. Land values there have increased from 100 to 400%—in far greater proportion than the taxes on the land have increased. It is not economy to cut down on what adds to our cultural and economical development.

"Be cheerful," he said in closing. "We have not yet started to build roads. Twenty years from now we will have ten crushers where one is today."

# Railroad Rates and Traffic

IN introducing the subject, President Sloan said that railroad rates were important because "in the last analysis it is the delivered price that governs the sale of our product." He then called for a report of the railroad committee which was made by Otho M. Graves.

### *The Slag Rate Case*

Mr. Graves said that since the last annual convention the committee has attended hearings before the Interstate Commerce Commission, brought by one group of slag producers against another group, each claiming that the other interfered with its business.

The position taken by the committee before the commission was that it was not so much interested in the zone or mileage scale of rates which was under discussion, but it did want the commission to bear in mind that crushed stone was a similar commodity to crushed slag, in that it was a low priced commodity delivered to the same communities for the same purposes. Hence it thought that the commission should not discriminate between the two in the matter of rates.

The committee had some difficulty in intervening. The commission appeared to be interested, however, and called on the Pennsylvania railroad to get all the interests together. The Pennsylvania reported that they could not arrive at a decision as to rates and so the commission would have to decide. The Pennsylvania said that it would not discriminate between stone and slag, but a number of railroads got together and apparently wanted to make a lower rate on slag.

A conference was held at which the attorney for the slag producers assured them that all that was wanted was the same rate that crushed stone would have if the rates were lowered. He suggested that there was no necessity for the committee to attend the hearing, but the committee said that the members of it had made up their minds to go anyway, so F. W. Schmidt, W. L. Sporborg and the speaker himself went to Washington and attended the hearing.

While no decision had been rendered, the minds of the committee were easy, as it seemed apparent from the testimony and the way it was received by the commission that the commission would not grant a lower rate for slag than for stone.

In the other cases in which the committee was interested, the so-called Birdsboro scale had been placed in effect and the commission had held repeatedly that slag and stone were competing commodities. The speaker believed that if producers found their rates higher than the rates on slag under the Birdsboro scale, they would be able to get the carriers to reduce the rates to the slag rates by making such a request.

### *Cancellation of Kelly's Combination Rule*

Mr. Graves in this part of his report gave a very clear exposition of how the commission stood on the matter of cancelling the Kelly tariff. The commission is anxious to get rid of it, as it is a source of much trouble and litigation. The trouble comes from the fact that all railroads are not bound by the Kelly rate, only those which were operated by the government during the war. The roads which are not bound want to collect their single-haul rate from the junction and this is more than their share on a mileage basis.

He said that producers were wrong in thinking that the commission would permit the Kelly tariff to be cancelled in favor of a higher rate, as the commission had repeatedly held that it would not tolerate the abrogation of the Kelly rate unless joint rates based on the Kelly rate were first issued. He thought it the duty of the association to watch the issuance of new tariffs and said that shippers should protest to carriers if any new joint rate was higher than the Kelly rate, and the association should back them.

The discussion which followed left no doubt that the shippers want the Kelly tariff retained. President Sloan said that Illinois and Missouri had each a $100,000,000 road program and Minnesota a $60,000,000 program, and he asked if it was reasonable to suppose that railroads would publish rates to a lot of the flag stations to which the materials would be delivered. "Isn't it better," he asked, "to have a rate that we can all figure to these points?"

To bring the matter to a head, Mr. Graves moved that the resolutions committee be instructed to address the commission and the carriers, stating the unalterable opposition of the shippers to the cancellation of Kelly's tariff without the issuance of joint rates on the same basis. This was afterwards modified to a statement of what the association considered the position of the commission on the matter of cancelling the Kelly tariff and a request to know if this was correct. The resolution was adopted.

# Contractors as Risks for Material Accounts

IS the material man protected when he sells an irresponsible contractor his output? This is a live question and it was quite thoroughly discussed at the National Crushed Stone Association Convention. A paper by Frank Page, chairman of the State Highway Commission of North Carolina, read by Chairman Graves, on "Surety Bonds for Contractors," said, among other things:

"As we are considering the contractor and the bonding company as one, I would like to ask the contractors here present if, under any circumstances, you would give to an agent of yours, unlimited authority to bind you, issuing to him a power of attorney with a seal, to go into a state and bid unlimited on the contracts offered. This is exactly what many of the bonding agents are allowed to do for the bonding companies. They have authority to bind them for any amount and these men who represent the bonding companies have not the slightest knowledge of the requirements for construction on a highway project, and their principal interest lies in persuading the contractor to pay them a premium on the bond they propose to issue. I think I know of a rather large number of contractors who have been the victims of over-zealous bonding agents, and afterwards find it necessary to default their jobs.

"In the expenditure of $75,000,000 in North Carolina, covering about 700 different projects, there have been 35 of these projects defaulted, involving 21 separate contractors. The method in North Carolina employed in awarding contracts, is by competition. A number of contractors will come in and submit their bids on the proposed work with a bid bond attached to each bid, and after the bids have been tabulated and the low bidder has been ascertained, in many instances the agent of some surety company who has issued the bid bond for the contractor, will come in and introduce Mr. Jones as the successful bidder, and tells what a wonderful contractor Mr. Jones is, that he has just completed a large contract in California perhaps, and that his, the bonding agent's company, is ready and even anxious to write Mr. Jones' performance bond. What is a state highway commissioner going to do under these circumstances? Should he hold up the award of the contract until he can make a personal investigation of the responsibility of Mr. Jones? The thing that we have been doing in the past, is to award the contract based upon the assumption, and I say upon a false assumption, that the surety companies have made a careful canvass of the facts upon which they based their statement relative to Mr. Jones' responsibility. If we should do otherwise than award the contract to the low bidder, we would subject ourselves, properly, I think, to the criticism of our people, that we were selecting some preferred contractor and were not awarding the bid to the lowest bid submitted.

"These 35 projects which involved 21 separate contractors have gone to the bad in our state."

# Agricultural Limestone Production, Promotion and Sale

E. M. LAMKIN, chairman of the group meetings of those interested in agricultural limestone, conducted these conferences with his usual vivacity and frankness. There were present and took part in the discussions, agricultural experts, railway business promotion representatives, and producers. As might be expected, there were several diverse subjects, and many angles of approach to each subject discussed. We will endeavor to sort out some of these and present them in logical, if not chronological, order.

### *A Potential Business*

A considerable part of the discussions was directed to establish the point that the *demand* for agricultural lime and limestone *ought* to be in the neighborhood of 50,000,000 tons in a year in that part of the United States east of the Mississippi river, whereas actual consumption today is only about 2,000,000 tons. We have published these figures in Rock Products several times previously, if indeed they did not originate with us, so we assume that our readers know these facts and the reasons for them.

Nor does the average limestone producer need to be convinced that it is profitable to the average farmer to lime his land. The big difficulty of the producer is to convince the farmer.

Getting down to "brass tacks," R. C. Towle, manager of the agricultural department of the National Lime Association, Washington, D. C., contributed the following in regard to the immediate prospects of the business in 1925. "If the figures I have are correct and we are actually placing only 1 ton in a possible 20 or more, we at least have the satisfaction of knowing that one-twentieth of the potential tonnage was made to yield. We cannot, of course, expect to start out this year and round up the other 19 tons, no matter what concerted effort, from whatever sources, might be brought to play, but if figures do not lie, if the practical tests of doubting farmers mean anything, if the demonstrations of enthusiastic county agents may be justified, and if the conclusions of cold, scientific investigators are based on sound premises, then, while it is not at all feasible to expect an immediate 100% yield from the entire potential tonnage, it sounds not only feasible but entirely possible for every manufacturer of a soil-liming material to sell 2 tons of his product during 1925 for every 1 ton he sold in 1924, for even then the possibilities in this field would hardly seem to be uncovered. But actually we know that this can hardly be accomplished, for it would be doubling our present business, and that is surely a large order.

"However, there is no myth about the potential tonnage being there, and from the present outlook it would appear that good salesmanship can wring some of it loose.

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"The United States Department of Agriculture is responsible for a statement to the effect that it is no secret that the maintenance of soil fertility problem on the majority of farms has suffered severely in the past few years by reason of the farmer's decreased purchasing power and his consequent inability to buy clover seed, fertilizer and liming materials, without which any farm is seriously handicapped in the matter of keeping soils fertile.

*E. M. Lamkin*

***Chairman of Agricultural Limestone Meeting***

"However, while U. S. Government reports of the farmer's increasing purchasing power and his very evident need for soil liming undoubtedly indicate that the coming year offers possibilities in the sales of lime and limestone that have heretofore been somewhat hemmed in, nevertheless history does repeat itself, and while we should certainly take steps to make a normal increase in our sales, it is equally certain that no one need plunge headlong into the production of agricultural lime or limestone on the strength of general appearances, for in so doing he will certainly carry his enterprise into oblivion.

"What we want to do is to work off the surplus already on hand. It is easy enough to locate limestone deposits in many parts of the country and to go ahead, if there is sufficient engineering ability and experience, and build a modern plant, but from data at hand we can estimate very accurately that the present equipment of the combined lime and limestone industries will take care of any increased consumption that may come to pass in the next several years. Our big problem is not one of production but of marketing."

Mr. Towle presented a lengthy and logical argument for the sale and distribution of agricultural limestone through dealers. This has long been and still is a moot question in limestone production and sale.

### *The By-Product Problem*

The agricultural limestone business has ever been complicated, and is likely to remain complicated, from the fact that what is the chief product of many plants is but a by-product, or even a waste-product, with several large producers. This is to some extent a local problem, but because of low freight rates in the big agricultural-lime consuming states it is a mighty serious problem to the present producers of most of the agricultural limestone now used.

The solution of this problem is further complicated by very diversified opinions, even on the part of disinterested agricultural experts as to the relative value and suitability of soil liming materials—screenings, meal, pulverized stone, lime and hydrate. It is naturally in the interests of those who make agricultural lime or limestone a major product to want to carry the manufacturing operation to the farthest degree, while those who wish to market by-products, or waste products, wish to get rid of them in their present form so far as possible; and agricultural experts are arrayed in either side and on both sides.

Among those who discussed this phase of the subject, pro and con, were Carl Ruedebusch, president of the Mayville White Lime Works, Mayville, Wis.; Prof. J. A. Slipher, of Ohio State University; G. C. Krause, Columbia Quarry Co., St. Louis, Mo.; D. W. Yambert, France Stone Co., Toledo, Ohio; E. C. Dodson, president of the Texas Stone Products Co., Dallas, Texas, the chairman, E. M. Lamkin and others. There was a wide divergence of opinion, as there always will be, when it becomes necessary to apply general rules of business to any one particular operation.

Chairman Lamkin contended that "there is without a doubt an overproduction of agricultural liming material and I believe today that the business is unprofitable. I believe that if the average concern took into consideration its tremendous selling expense and overhead added to the amount of shortages in saleable products that must be made up it will be found that it is costing considerable to market agricultural liming material, therefore prices should be higher instead of lower and I do not believe that anyone is really making money under present conditions. Some years ago a large section of the industry were anxious to dispose of this product and sent out letters stating it was a by-product, it cost them nothing and they

would practically give it to the farmers for the freight. That, without a doubt, has a tendency to tear down what we are trying to build up today.

"We never are going to be able to build up this business without the financial aid with which to do it. We can't take the profits of one department of a business to support another department. Each department must stand on its own feet. In order to do this, in order to develop it, in order to put it across in the manner it should be you must have sufficient price so that there is enough margin between your production cost and the actual price to do the actual sales work. And that has retarded most concerns."

### *Fine vs. Coarse Material*

A matter of much importance to producers of agricultural limestone is how coarse, or how fine, should the material be? No one has answered that question satisfactorily. Professor Slipher contended, and most agriculutral authorities agree with him, that the finer the material the more active and valuable it is, and he believes the present tendency is toward the use of pulverized material. On the other side is the example of farmers in Illinois and Iowa who are using nearly as much agricultural limestone as all the rest of the country taken together, and most of it is screenings —¼ in. to dust.

Mr. Krause summed up the Illinois situation from the producers' standpoint when he said: "We are all interested in getting the farmer started buying. We can produce the coarse material cheaper than the finer. The farmers scare at a higher price. Wouldn't it be better to grind only *some* finer and make two products? Professor Slipher answered this question as follows: "I think it would be better for the farmer if he were to buy the finer product, about 80 to 90% through 100-mesh. Even if the price went up to $3 per ton, I would consider it a better buy. We are coming, I think, to the day when the farmer will see it. The sooner we get behind that idea and push it along the quicker we are going to arrive at that point."

C. G. Black, of the France Stone Co., Toledo, asked: Wouldn't it be better to make two different grades and get a better price?" To which Prof. Slipher replied: "In case your plant condition permits, yes. As that material stands now the farmer has got to pay freight on the coarse portion, haul it, handle it, and yet he is not going to get any real value. Now the $1.75 price is really paying for that finer fraction which he gets. If you could build up a trade of finer material and begin building up a demand for your finer product you could gradually give up the coarse type. For a number of years past up to about five years ago, say beginning 15 years ago, there was a tendency to go to coarser grade material, and as a result, after a long campaign, the farmers and many of the workers have gotten it in their minds that coarse material is the thing to use. It is going to take a whole lote of education to offset that fact and to bring the minds of people back to the point of using a finer material."

Further discussion naturally led up to the possibility, or the feasibility, of having a universal lime and limestone law, or legal definition of the relative values of the various liming materials. Ohio does have such a law now.

One bright thought was contributed by Russell G. East, of the agricultural promotion department of the Pennsylvania Railroad, who said: "The thing we want to get to the farmer is a *system of soil improvement.*" Those who know Illinois conditions know that just this thing is getting to the farmer and consumption of agricultural limestone has increased accordingly. Mr. East also expressed the willingness of the Pennsylvania lines to co-operate in limestone promotional campaigns by contributing a special limestone demonstration train.

### *Discounts or No Discounts?*

Would a larger cash discount have a tendency to encourage prompt settlement of accounts? Judson C. King, of the Carbon Limestone Co., Youngstown, Ohio, answered this question as follows: "We decided that 2% was not sufficient to get the money in quickly and we don't like to extend our accounts over a period of several months, therefore, we are trying out a new plan, that of giving 10 cents a ton discount. The object is to get the money quickly and make the agent collect at the car for the limestone that he sells. Farmers can pay the cash if you only make them."

Chairman Lamkin said that several other companies have adopted this idea. In Ohio they didn't arbitrarily make a discount of 10%. They raised the price 10 cents and now give the 10% off.

E. T. Walker, of the Casparis Stone Co., Columbus, Ohio, said: "We adopted that a year ago, and it has worked admirably. Our terms are 10% per ton 10 days. We get about $2.25 net for bulk shipments in open-top cars."

Mr. Krause, of St. Louis, stated: "We don't give any discount at all. We find that nine-tenths of the farmers pay within 15 days and in the course of a year or so we don't lose over $200 in the sale of 100,000 tons."

T. E. Putnam, of Pittsfield, Mass., said: "I used to sell in carload lots f. o. b. plant. The farmers paid the freight and the railroad would remit to me. I never missed a car. They always paid for it before they got it. That eliminated a lot of bookkeeping, worry and everything else. Of course the farmers may be differentlly situated in this section of the country."

### *Delivered or Plant Price?*

Is it advisable to absorb freight rates on agricultural limestone and have a uniform price throughout a locality where there is a variety of freight rates, losing on some business, making a high profit on some and averaging a fair profit on the business of the locality as a whole?

Mr. Krause, of the Columbia Quarry Co., St. Louis, Mo., gave as his opinion: "In Illinois this coming year we expect to quote everything at a delivered price. You take a farmer on the county line pays $2, if he is in 'A' county and his brother in 'B' county has to pay $2.20. Now they compare notes and the brother in 'B' county decides he has a kick, and who does he get sore at? Not at the railroad. No one but the producer. So we are trying to equalize the price. That is, lay down a definite price for the whole county. Say in 'A' county we have a freight rate of one dollar and we consider it necessary that we receive 90 cents a ton at the quarry. We set our price at $1.90 a ton delivered in that county; and suppose on the other railroads we have a lower rate, say 80 cents. We make that much more money out of it and don't have so much confusion. The farmers don't think about the railroads, they are buying their stone from the producers and there's where they put the kick. They can't see the railroad's point, so we figure on selling at an even price and have it cover three or four counties. If necessary, raise the price and have it uniform, and don't have a dozen prices in one county. You create discontent among the farmers, and the farmer is a skeptical sort of person, but he is your customer, so many people forget about that fact, he is the man who is buying, so treat him fair and he will come around to you."

The other side of the argument was presented by Chairman Lamkin as follows: "If I am a farmer in a certain district and the freight rate to my farm or my switch is 90 cents and down below through another line haul my neighbor's freight rate is $1.50, 60 cents higher than mine, why should I be compelled to pay part of his freight rate by paying a delivered price on the matrial? I think that is one of the most beautiful arguments for your competitor that I know of. It is fundamentally wrong in the principle of salesmanship, and it will never work out where you have a lot of competitors. In marketing any material, no matter what it may be, if your policy is such that it can be legitimately attacked by your competitor your policy is wrong. And I believe further that in setting a policy of sales you must get over on the other side of the fence and look at your market problems in the same light your customer is going to look at them, and if the policy looks fair from that angle it no doubt is fair. Mr. King, what is your opinion?" Mr. King replied: "Every man sitting around this table is quoting delivered prices today. When you get an inquiry for a carload of agricultural limestone you say my price is so and so. You quote a delivered price by giving the plant price plus the freight to destination. There is only one county where we have made a flat rate and that resulted in

a benefit to the farmer. We lost 10 cents a ton in some cases."

To which Chairman Lamkin replied: "There is quite a difference in quoting a flat rate and taking the plant price and absorbing freight rates."

Mr. East, of the Pennsylvania Lines, contributed this: "Just a little psychology. Isn't it possible that you can sell more limestone for $4.30 per ton than you can sell for $3.40 per ton plus 90 cents freight? I may be talking from the railroad standpoint now, but it is sort of a national pastime to kick on freight rates and when you give someone the price on limestone maybe he thinks that is a little high and then you quote him a price on freight, he has just two chances to kick where he had one before."

Mr. Krause: "Nine times out of ten, if you quote a delivered price, the farmer will be perfectly satisfied, but if you say: 'My price is $2 and the freight rate is $1,' he will say: 'How in the world do you get a price of $2? This railroad is carrying this stuff 125 miles for $1."

### *Portable Crusher Competition*

In defense of the portable farm crusher, John T. Fowler, of the Jeffrey Manufacturing Co., Columbus, Ohio, spoke as follows: "I would like to explain what the portable crusher is, and in what way we have used portable crushers in connection with agricultural limestone. It is a small equipment that a farmer can operate with what he usually has available—a tractor. I know where it has been placed 25 miles from the railroad. That farmer has limestone on his land. He has got a long haul from the railroad. He can take the tractor and produce on an average of about 2 or 3 tons an hour of ⅛ in. and under. It simply introduces the limestone in that neighborhood. Eight years ago that little machine sold for about half of what it sells for now. The farmer can't afford to buy that machine now as he did eight years ago. At that time we had an intensive advertising campaign and we sold hundreds of them. The price now is prohibitive to the farmer, but we get hundreds of inquiries until they get the price then they are not interested. We still sell the small machine, but not as we did when the price was half of what it is now. From seven to nine miles from the railroad that machine has proven very good. In Wisconsin and Kentucky the states are buying these small machines and renting them to the farmers. We have got a number in both states."

W. E. Stone, Ohio Marble Co., Piqua, Ohio, contributed the following experience: "My experience in this field is very short, as I only went there the first of the year, but I have had, during my experience as county agricultural agent, some experience with portable crushers and I believe they are not much of a factor except where the farm is located at a great distance from the railroad. About five years ago we had five machines operating. At the present time not one of these is operating because the farmers have figured the cost, and since all of them are located at convenient distances from the railroad they are buying from the producers; and last fall there was shipped something better than 2500 tons, which is a big consumption of agricultural limestone for a city county. I believe local crushers are not a factor to be considered seriously."

### *Freight Rates*

Mr. King: "The freight rate on agricultural limestone is exceptionally low. You will never be able to obtain lower freight rates and you cannot reasonably expect or plan to ask the railroads to make a reduction in that classification. I think we have a low enough freight rate."

Mr. Krause: "The rate we pay on ground limestone is really for an 8 to 10 mesh down product. It is pretty hard to compare because of the various distances. We take as an average freight rate in our territory about 80 cents—that is, in our good territory. We haul it up to 80 miles.

### *Co-operation of Agricultural Authorities*

Mr. King: "I do not believe that we can reasonably expect the county agricultural agent to sell our product. They can only boost the sale, and if we feel we are not getting sufficient co-operation from the county agents, extension bureaus and the state colleges it is our own fault. Now you can't expect to go to our county agents or agricultural bureaus individually and say that you want them to boost agricultural limestone, but go in as a body, because any organization will recognize a group of men who represent a large tonnage or commodity in which the state of Ohio or any other state agricultural college is vitally interested. They will recognize that group and boost the sale of that particular product, then it is up to you to get your share of those sales. But you have to work with them."

### *The National Agstone Association*

Chairman Lamkin: "Every producer of agricultural liming material, whether it be lime or limestone, should be a member of the National Agstone Association. In the words of Secreary Sandles—'You make wages by coming to our meetings.' I think you will agree with me in the sections in which we have enjoyed membership we have had a more stable condition. At the last meeting of our association in Columbus last Thursday we found our finances in such excellent shape that we believe it advisable to drop down the cost of membership to $25 per membership. Now that is a very low figure, therefore a concern is privileged to take out as many memberships as they choose. I know of six different concerns that have already taken out five memberships each, however, that doesn't mean that you are required to take out more than one. We will welcome one or two or three or more as you see fit. It all helps to finance the work which we are carrying on."

Mr. King: "We decided that there were so many things being written from time to time and published in the various trade papers throughout the country and in the various local newspapers that there was more than we ourselves could absorb even though we had time to read all these articles—articles containing the meat of the business,—articles containing the things that agricultural limestone already does. We, as a group of business men do not have time to read those articles, even though we have the opportunity of looking them over. Now the thing we decided to do was this: We made this proposition to the Soils Department of the Ohio State University: 'If you will appoint one of your upper classmen and allow him to devote a certain amount of time in culling, gathering these articles and especially articles that might originate from Ohio State University, gather them into a newsy letter once each month and sent that letter out to the members of this Association, we will guarantee to pay to the Ohio State University or to that student, $600 a year."

### *Promotional Work*

"We agreed to pay $600 for those articles and get them into one letter, broadcast them to the different members, and the members in turn, some of them at least, republish those letters. They are usually four, five or six pages, and send them out to all their distributors. Now these different articles are digested. In no instances does he give very much of an excerpt. Three or four paragraphs at the most. A long article contained in a bulletin of eight or ten different pages will be gone through and the meat taken out and given to you. I have immensely enjoyed reading those letters for the past two years and the money has been wisely spent in the promotion of that work.

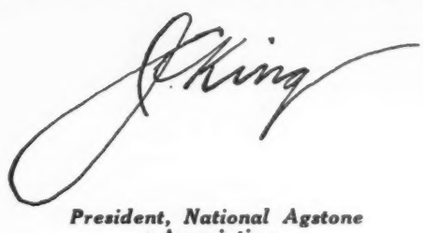
"We take those same letters and mimeograph them and send them out to 350 distributors and those distributors wait for months and months in order to get that material because it is a selling help. You cannot give to your agent in the field too much information nor can he be too highly educated on the subject. Therefore, the more information you give to him, the more capable he is going to be. Now we decided in our last meeting, I think, that at this convention we would explain that letter which we call the Alger Research and to those who take out memberships it doesn't necessarily mean that you are manufacturers or producers of agricultural limestone in the state of Ohio. You might be in any part of the United States and if you will take out a membership which will cost you $25 per year, or two memberships at $50, or three at $75, or one if you wish, and that one membership will entitle you to one copy of

Alger's letter monthly and you can distribute it to these people if you so desire."

## Meeting of the National Agstone Association

THE twelfth annual meeting of the National Agricultural Limestone Association was held in the Hotel Gibson, Cincinnati, on January 14, for the election of officers for 1925.

The meeting followed a luncheon for the Agricultural Group of the National Crushed Stone Association, during which representatives of three companies pledged for membership in the National Agricultural Limestone Association. These companies were Mayville White Lime Works, Mayville, Wis., represented by Carl H. Ruedebusch, president, and his son, C. G. Ruedebrusch;



***President, National Agstone Association***

Wallace Stone Co., Mayport, Mich., represented by W. H. Wallace, Jr., and the Columbia Quarries Co., St. Louis, Mo., represented by G. C. Krause, son of E. J. Krause, president of the company.

The newly elected officers of the National Agricultural Limestone Association are: President, Judson C. King, sales manager Carbon Limestone Co., Youngstown, Ohio, suceeeding P. B. Reinhold; secretary and and treasurer, Wm. H. Margraf, manager agricultural department, Marble Cliff Quarries Co., Columbus, Ohio, succeeding A. P. Sandles; vice-president, Edgar M. Lamkin, sales manager, agricultural department, Kelly Island Lime & Transport Co., Cleveland, Ohio, succeeding Thos. McCroskey.

# Concrete Aggregate and Highway Materials

AT the first meeting of the concrete aggregate group at luncheon, the only meeting not held with the highway group, C. D. Franks, of the Portland Cement Association, was the principal speaker. He gave the results which had been obtained by the association and other bodies in testing aggregates which tended to prove that the material of which the aggregate is made does not so much matter so long as it is structurally sound, clean and reasonably hard. He gave as the fundamental principle of concrete mixtures:

"The strength of the concrete is fixed by the ratio of volume of water to volume of cement, so long as the mixture is workable and the aggregate inert and made up of hard durable particles. Workability depends on grading of aggregate and consistency. The smaller the quantity of water with reference to the cement, the stronger the concrete.

"Thousands of tests carried out on many different types of aggregates have demonstrated the accuracy of this principle within wide limits. The quality of the aggregates plays a relatively unimportant part in fixing the quality of concrete except insofar as it affects the water-cement ratio which must be used in order to produce a workable concrete.

* * *

"The economic selection of an aggregate, therefore, consists in choosing materials of suitable cleanliness, hardness, and durability which will produce concrete of the required workability and strength with a minimum of cement. Since the water ratio fixes the strength, this resolves itself into choosing materials, which will produce the most concrete or a given amount of concrete at the least cost of material for a given water-ratio.

### *How Water-Cement Ratio Affects Concrete Strength*

"Tests carried out both in the laboratory and in the field have shown that the average strength of concrete when molded into 6x12-in. cylinders and tested under standard conditions may be represented by the following relation between strength and quantity of mixing water:

| Compressive Strength at 28 Days Lb. Per Sq. In. | Limiting Quantities of Mixing Water Gal. Per Sack of Cement |
|---|---|
| 2000 | 7 to 7½ |
| 2500 | 6¼ to 6¾ |
| 3000 | 5½ to 6 |
| 3500 | 6¾ to 5¼ |
| 4000 | 4¼ to 4¾ |

"Field tests carried out on seven different construction projects in New York and vicinity by our laboratory in co-operation with the Associated General Contractors have shown that properly made tests of concrete placed under field conditions will give results of which 85 to 90% are higher than 80% of the value given by this relation.

"From the engineers' viewpoint only the water ratio, and quality of aggregates so far as hardness, durability, and impurities are concerned, time of mixing, curing conditions, etc., need be specified, with the added provision that the concrete be workable and produce a suitable appearance. The matter of proportions, grading of aggregates, and plasticity of the concrete can be left almost entirely to the contractor or construction engineer, and these will be dictated by that most exacting of all task masters—cost."

***Chairman, Concrete Aggregate Meetings***

R. W. Scherer, of the Western Lime and Cement Co., Milwaukee, Wis., in commenting on Mr. Franks' paper, said: "I admire Mr. Franks for coming here and telling us what we didn't want to hear, that our concrete aggregate wasn't any better than anybody else's.

"Well, it is a little hard to go in the face of all the wonderful research that has been done by the Portland Cement Association, and Lewis Institute, but if you want to sell crushed stone, and somebody else is offering gravel at 30 or 40% less—and believe me they can cut from 60 cents quicker than we can from $1—I leave it to you in all conscience, what is going to sell stone unless we can claim superiority of the product?

### *Tests That Showed Crushed Stone Superior Aggregate*

"Now, as a matter of fact, crushed stone

*is* superior. If you don't believe it, try it. It was that way four or five years ago, and I think it still is. The test I remember was an elaborate one, conducted by the Bureau of Standards at Washington. I forget what the purpose of these tests was, but it was an elaborate series. They broke thousands of test cylinders and named the aggregates that were used. Now at that time I was looking into this in the interests of the Crushed Stone Manufacturers of Wisconsin, and I found that the average of all the samples—there were 34 samples, or near that number, in the national survey, nine of which came from Wisconsin, five crushed stone, five limestone, two granites and two gravels. Now, whatever the tests were made for, the fact is that Wisconsin limestones averaged 50% stronger than the Wisconsin gravels in concrete, exactly 50%. The weakest of the limestone was stronger than the strongest of the gravels. How far that is true of gravels and stone in general I wouldn't undertake to say. The difference was not quite so great, as I remember, on the contrary as a whole.

#### *Should Be a Differential on Crushed Stone*

"My idea of the thing is to find out by tests, and they can be fairly conducted, the comparative merits of these materials. It would be possible to define with what percentages of cement each aggregate might be mixed to get a satisfactory concrete; and in various states there are movements in that direction today. If that can be done and it would be perfectly fair to everybody concerned, to the producers of all kinds of aggregate, I think the stone would come out way on top.

"If we could work in any concrete, whether it is for road or for structural purposes, with 15 or 20% less cement for stone than for gravel—I am sure we can—you know what that would mean. And it is concrete that we want, it is concrete that does the business, that the state wants, that the owner wants. He doesn't care about what is in it, but it is the finished concrete that will stand up that he wants.

## Specifying Aggregate by a New Method

The paper by A. J. Schrafmeyer, City Engineer, Chicago, on "Modern Crushed Stone Specifications for Street Improvements," was one of the most important of the convention because it outlined a method of specifying concrete aggregate which may almost revolutionize the aggregate business by simplifying the production of crushed stone for aggregate.

Mr. Schrafmeyer said that the present Chicago specifications called for an unwieldly number of sizes including two comparatively fine sands, 10 sizes and gradings of limestones, six sizes and gradings of gravel, nine sizes and gradings of granite or trap and eight sizes and gradings of slag, making a total of 35 varieties of aggregate.

The Chicago Board of Local Improvement has not yet adopted the fineness modulus for concrete aggregate because there are reasons why the board should follow common practice rather than lead. If common practice is followed the board can come into court and show that it has followed established customs and standards in special assessment work, and property owners can check the reasonableness of estimates.

He admitted that the adoption of the method of designing concrete by the fineness modulus of the aggregate would be beter and it might avoid rejecting certain shipments of stone which cannot be accepted now. It would also be much better and simpler for the producer. To explain this he spoke of the work of Paul E. Kressley, consulting engineer of Los Angeles, described in the June issue of the *Western Highway Builder*, and said:

#### *New Method of Calculating Coarse and Fine Aggregate Proportions*

"As noted before our architects and engineers now specify the various sizes desired with considerable rigidity. A considerable demand in one line may result in a shortage in certain sizes and a surplus in others. Now if the specifications followed Mr. Kressly's method, which require 1 part of cement to 4.6 parts of the mixed aggregate the crushed stone producer would have much more latitude. The quantities of fine and coarse aggregate to be used to produce the 4.6 parts of combined material were determined by two formulas based on the fineness modulus of the aggregate. The formulas are:

$$C = 5.80\,\frac{a-6.40}{a-b} \quad \text{and} \quad D = 5.80 - C$$

in which $a$ is the fineness modulus of the coarse aggregates, and $b$ is the fineness modulus of the fine aggregate. C is the number of parts of fine aggregate and D is the number of parts of coarse aggregate.

"Tests were made upon the local aggregates from the results of which the ratio of 1 to 4.6 was selected as producing a concrete of 3000 lb. crushing strength. A table based on tests was also made, using a required fineness modulus of 6.40 for the mixed aggregate from which the varying ratios of coarse and fine aggregate necessary to produce the desired mixtures were readily obtained."

After describing how the fineness modulus is obtained, he said: "With specifications based on the fineness modulus, a producer of crushed stone could vary the sizes and quantities of the coarse and fine aggregates within the limits of the formulas provided that the total volume of the combined aggregate would equal 4.6 times the volume of cement, and would have a fineness modulus for the mixed materials of 6.40.

"Knowing the grading of the sizes of stone in the ordinary output of his crusher the producer could, with the proper study, plan his deliveries in such a way as to dispose of the greater part of his output without accumulating a surplus of uncalled for sizes."

Following this Mr. Schrafmeyer gave some illustrations from Mr. Kressley's work in Los Angeles and closed by recommending that the convention appoint a committee to consider the matter.

## Stone for Use in Asphalt Pavements

The subject of stone for use in asphalt paving was discussed in a paper by Prevost Hubbard, secretary of the Asphalt Association, at a group luncheon. A part of the paper follows:

"In all of our specifications for broken stone products, there is a clause requiring that they shall be of reasonably uniform quality and clean. Incrustations of earth, clay or other foreign materials are particularly objectionable, because they prevent adhesion between the asphalt and the surface. If the asphalt does not adhere to all contact surfaces, the pavement will be affected by water action with consequent disintegration. In addition to the above, for the larger sizes of commercial products, freedom from dust and no excess of flat or elongated pieces are specified. The presence of stone dust is objectionable, even if it does not adhere to the larger fragments as the total surface area of mineral aggregate is enormously increased and the amount of asphalt required to coat and bind the aggregate together depends to a considerable extent upon surface area. Stone dust is very necessary in certain types of asphalt pavements, but it must always be treated as an individual constituent and should be covered by separate specification requirements. An excess of flat or elongated fragments is objectionable, because such fragments tend to prevent uniform distribution of asphalt throughout the pavement in the case of asphalt macadam construction and produce unstable mixtures in other types. Stone which breaks into approximately cubical fragments in general gives best results. Most slate, shale, and other highly schistose rocks are therefore not suited for producing the coarser commercial products.

#### *The Three Types of Bituminous Pavement*

"There are three principal types of asphalt pavements in which crushed stone is used, (1), asphalt macadam; (2), asphaltic concrete, and (3), sheet asphalt.

"The asphalt macadam wearing course is usually constructed from 2½ to 3½ in. thick, depending upon the quality of broken stone available for use. The separate use of three broken stone products is required in its construction. The coarsest product is first laid upon the foundation course and

rolled until the fragments key together, after which hot asphalt is applied from the surface. In order that the asphalt may properly penetrate the road, it is essential that the stone fragments should be as uniform in size as possible, so that voids will be evenly distributed throughout the course. The dimension of the stones should also be of such size as to produce voids into which the asphalt will flow before it has cooled. The use of a graded stone product prevents uniform penetration and makes a poor job. After the asphalt has been applied, a second product known as 'chinking in' or 'choker stone' is used in just sufficient amount to close the surface voids, after which a light seal coat of asphalt is applied and covered with a dressing of stone chips. The choker stone should be of reasonably uniform size and of such dimension that one layer will key into the surface and fill the voids. If very fine stone is used for this purpose, there will be a number of layers one on top of the other which may prevent the seal coat of asphalt from adhering to the underlying surface. Stone chips for top dressing is the finest of the three stone products used. It should be reasonably free from dust for reasons previously mentioned.

"Specifications for size as determined by laboratory screen tests ordinarily used in asphalt macadam construction are as follows:

| | Per Cent Passing Screen | | | | | |
|---|---|---|---|---|---|---|
| Size | 2½" | 1¼" | 1" | ¾" | ½" | ¼ |
| Coarse | 95-100 | 0- 15 | ..... | ..... | ..... | ..... |
| Intermed. | ..... | 95-100 | 25-75 | 0-15 | ..... | ..... |
| Fine | ..... | ..... | ..... | 95-100 | 25-75 | 0-15 |

"If stone with a percent of wear of less than 6 is available, this maximum limit is usually placed in the specifications. It is, however, quite possible to use stone with a higher percentage of wear in this type of construction because of the protective action of the asphalt so that the limit of 6 need not be insisted upon. If more than 8% of wear is allowed, because only very soft stone is available, the specifications for coarse aggregate should be changed to require from 95 to 100% to pass a 3½-in. It is then necessary to lay the wearing course 3½ in. thick and use more asphalt. In such cases, the larger size stone is desirable because being soft the edges and corner crush down under rolling and thus reduce the size of the voids.

### *Two Types of Asphaltic Concrete*

"There are two types of asphaltic concrete pavements which require quite different commercial broken stone products. These are known as the coarse graded aggregate and the fine graded aggregate asphaltic concrete. In the construction of these pavements the mineral aggregate is heated and combined with asphalt to produce a paving mixture which is then laid upon the prepared foundation. All of the constituents must be carefully and accurately proportioned for each batch of mixture and uniformity is therefore of prime importance.

"In the coarse graded aggregate type, broken stone predominates. Sand is used to fill the voids in this aggregate and stone dust to fill voids in the sand. This stone dust is known as mineral filler. The size of broken stone which should be used as coarse aggregate in the mixture has been determined by long experience with this type of construction. If too coarse, it tends to segregate and produce an irregular surface in the pavement with occasional open or porous sections. If it is too fine it does not interlock under compaction to produce the desired degree of stability. Between its maximum and minimum limits of size it should be reasonably well graded so as to hold the sand aggregate uniformly without segregation. Even with the most careful control this type of pavement produces a surface which requires a seal coat applied in much the same manner as for the asphalt macadam. A second commercial crushed stone product similar to, but slightly smaller than, the finest product specified for asphalt macadam is therefore used. The customary requirements specified are as follows:

H. M. Sharp

***Chairman, Highway Materials Meetings***

| | Per Cent Passing Screen | | | |
|---|---|---|---|---|
| Size | 1¼" | ¾" | ½" | ¼" |
| Coarse aggregate | 95 | 25-75 | ..... | not over 10 |
| Cover for seal coat | ..... | ..... | 95-100 | 0-15 |

"For coarse aggregate it is desirable to use stone with a relatively low percentage of wear and a maximum of 5% wear is usually specified. Softer stone is apt to crush under heavy traffic and as there is not sufficient asphalt present in the mixture to bind the crushed fragments in place, ravelling and disintegration are apt to occur.

In the fine graded aggregate type of asphaltic concrete, sand is the predominating constituent of the mineral aggregate, but broken stone is often used to the extent of 35% by weight. An abrasion test requirement is seldom specified. The maximum size of commercial broken stone best adapted for this type is about ½ in. or ⅝ in. It may, however, contain a considerable amount of material passing the ¼-in. screen provided it is uniform in this respect and can be mixed with sand to produce a product coming within the rather detailed grading limitations for the finished mixture. Its principal value lies in the fact that in the quantity used it reduces voids in the graded sand and gives a somewhat more gritty surface to the pavement than though sand was the coarsest mineral matter present. Grading requirements for this product recommended by the Asphalt Association are as follows:

| | Per Cent Passing Screen | | |
|---|---|---|---|
| Alternates | ¾" | ½" | ¼" |
| I | 95-100 | ..... | 0-75 |
| II | ..... | 95-100 | 0-75 |

"In the sheet asphalt pavement, commercial broken stone is used in the binder course which is interposed between the foundation and wearing course. Binder course mixture is somewhat similar to coarse graded aggregate asphaltic concrete and the size and grading of broken stone used is exactly the same as for the coarse aggregate for that type. The maximum allowable percentage of wear may, however, be raised to 6% owing to the protective action of the wearing course.

### *Sheet Asphalt*

In the sheet asphalt wearing course broken stone is not used but this type requires a considerable amount of mineral filler which under present specification requirements is met by finely ground limestone (including dolomite) and slate. All of this material should pass the 30 mesh sieve and at least 60% should pass the 200 mesh sieve. Mineral filler for asphaltic concrete pavements must meet the same requirements. This product is a very important constituent of all of the graded hot mixed types. Extreme fineness is highly desirable and the filler should readily combine with asphalt. Portland cement has been extensively used as mineral filler and some engineers have considered this product superior to limestone dust. We have recently devised a test for studying the relative suitability of various fillers and so far this test has shown limestone dust to be at least equally as effective as portland cement.

"In conclusion, I want to say that this mineral filler proposition ought to be an attractive one to you gentlemen, because at least as much mineral filler is used in asphalt paving construction as asphalt. While other materials and limestone dust are used, I think it is pretty safe to count for the immediate future on not less than one million tons of mineral filler being used in the construction of asphalt pavements."

At the conclusion of the paper, Mr. Sharp, the chairman of the meeting, said:

"It is my opinion that stone for penetration macadam, and I have had considerable

experience along that line, should be larger than the size specified in the tables of the American Society for Testing Materials, which is 1¼ in. to 2½ in. My experience with stone of that nature, and with building a penetration macadam road, is that the year following that in which it is laid, you will have more or less ravelling of the surface due to the segregation of the sizes of the stone. You will have patches of the surface where a square yard or two will be 1 to 1½ in. where you use stone 1½ to 2½ in., due to segregation and you can hardly prevent it. In order to prevent that, I think a larger stone, around 1¾ in. to 2½ in. to 3 in., is more desirable. That allows the stone to be bound into place, with the further assistance of bituminous binders. It may be that the next year after the road is built, you will have a rough surface; that it will be rougher than one built with smaller stone, but when you come on with the surface treatment a time or two, you will get a road that will stand up and wear and be free from ravelling."

#### *Bituminous Roads Use All Plant Output*

George Martin, engineer of the Barrett Co., Chicago, also spoke on the subject of asphalt paving and, in part, said: "I do not expect to go into the specifications in the way of building penetration macadam or water bound macadam. I would only call your attention to one or two points in connection with them. One is, with the penetration macadam construction, you practically use all of the sizes which the quarry produces; you use the small size stone to chink in, and for the base you run up to a maximum of 3½ in., so that you are using about all of the stone producer's output.

#### *Macadam Roads Take More Stone*

"I would like also to call attention to the fact that in building the water-bound macadam and the penetration type of macadam construction, you use more stone per mile than you do in many other types of construction. In other words, it is pretty nearly all stone, not altogether, but it is mostly stone construction, so that the material in which you are immediately interested is the one used most extensively in building this type. For example, a 12-in. waterbound macadam, 18 ft. wide, will require approximately 7,600 tons of stone per mile. An 8-in. water-bound macadam base with a 3-in. penetration top, 18 ft. wide, will require about 6,600 tons of stone per mile. A concrete, averaging 7¼ in. in thickness, that is, 7 in. in the center section and 9 in. on the sides, will require approximately 2,200 tons of stone per mile. In other words, with the penetration type of construction, a good deal more of the money that is spent on the road goes to the stone producer than in the other types, and, of course, you also eliminate gravel competition, because gravel is not used for the penetration type of construction, excepting in some cases where they use gravel for chinking stone, or for cover on the top.

## Washing Screenings to Make Fine Aggregate

THE following paper was read by Russell Rarey of the Marble Cliff Quarries Co. of Columbus, Ohio, at one of the group luncheons:

"In almost every stone crushing plant the maintaining of a balance between the production and demand for each of the various stone sizes constitutes a difficult problem. As a rule, a stone producer has one major market for his material and his plant is designed to produce the proper size for that particular market. Other sizes currently produced under such conditions are marketed as opportunity presents or regarded as waste and taken to the dump. Usually plants are installed to produce stone of comparatively large size, such as flux, railroad ballast, macadam stone, coarse concrete aggregate, etc.—the excess production therefore usually being classed as screenings.

"In Ohio we are marketing much stone on macadam construction. A plant engaged in the production of macadam stone, has its demand fairly well balanced, with the screenings being in current demand. The producer of stone for other markets, however, has excess fines and it is a real problem to move excess screenings currently.

#### *Reduce the Excess of Fines*

"One of the best ways to turn excess fines into profit is to reduce the quantity of the excess. This statement is so simple that it perhaps needs explaining. Let us cite a specific case to make our point. In Pennsylvania, crushed stone is specified for use as coarse aggregate in concrete road construction, the required size being 2½ in. down to ⅝-in. The sand used along with this stone is of maximum ¼-in. size. A spread in size therefore occurs between the minimum stone and maximum sand sizes. It is generally thought that, all other things being equal, the best concrete is secured when there is no spread between the fine and coarse aggregates. In Ohio stone specifications for concrete run down to 4 mesh. Sand being from 4 mesh down. Ohio specifications as to minimum size of the coarse aggregate if adopted in Pennsylvania would greatly reduce the amount of excess fines now troubling many Pennsylvania producers and untold benefit be thereby secured.

At our own plant at Marble Cliff, Ohio, we produce large quantities of flux, railroad ballast, etc., and in times past have had much excess screenings. After considerable investigation we installed a washing and sizing plant designed much along the lines of a gravel outfit. This plant is fed with stone, 2½-in. and less, from the initial crushing. The stone in passing through the plant is thoroughly scrubbed, properly sized, and placed in bins. Sizes produced are made to conform to Ohio state highway specifications and a fair demand for each of the various sizes is experienced. No. 6 stone is the smallest size of commercial stone used under any Ohio specification. This stone runs from ½-in opening down to about 7/32-in. round. Stone of size smaller than 7/32-in. is screened out and is carried along with the washer water to sand settling devices where it is dewatered and trapped into bins. This fine material is called limestone sand and fully answers the requirements of a high grade fine aggregate.

"Prior to our having a washing plant, effort was made to market screenings as sand. Results were not satisfactory for many reasons. The screenings did not run uniform (a separation of the chips from the dust or "flour" usually occurred) and uniformly good concrete was thereby made impossible.

#### *Engineers Glad to Get Limestone Sand*

"We have all experienced the opposition of the engineering fraternity when screenings are advocated as a fine aggregate, particularly in highway and reinforced construction. It was therefore a pleasure to see the manner in which the engineers and contractors accepted limestone sand. Every test made on this sand has proven definitely that uniformly good concrete can be secured from this aggregate.

"Sand specifications in Ohio state that 'concrete sand shall be composed of small particles of hard durable stone of ¼-in. size and less, graded from coarse to fine, with not to exceed 5% passing a 100-mesh screen. Sand shall be free from foreign organic matter, etc.' Under such specifications it is very evident why stone screenings will not be acceptable and likewise evident why limestone sand is entirely acceptable.

"In the matter of soundness of particles and freedom from organic matter, freshly crushed stone leaves little to be desired, while the grading and removal of excess silt and 'flour' is accomplished by the washing plant.

"We are able to produce reports from various engineers who have tested our sand both in laboratories and in actual construction work, such reports being highly pleasing. We can also show specimens of completed structures where our aggregates, both stone and sand, were used exclusively in the concrete work, such structures being mute evidence of the excellence of the materials.

#### *Used in Ohio Stadium*

"Limestone sand was used in the construction of the Ohio stadium at Ohio

State University at Columbus, the grading and cleanliness being so constant and so positive that not a single car on this entire project was refused. Since the completion of the stadium, limestone sand has found its way into bridges, pavements, reinforced buildings and concrete highways. Today washed limestone sand is offered in competition with any and every concrete sand and its quality is unquestioned.

"We feel that in working out the problem of disposing of our excess fine materials, we have developed a source of additional revenue, and at the same time provided ourselves with a high grade fine aggregate to be sold along with our concrete stone.

"We are now in no way dependent upon a gravel man for our fine aggregate, a feeling which in itself would entirely compensate us for our efforts even if no other benefits were secured."

In answer to questions Mr. Rarey said that limestone sand equaled or exceeded other sands in the strength tests which had been made. It had to be marketed in competition with natural sand.

Col. Chamberlain asked him to describe the washing of stored material, accumulated waste. Mr. Rarey said that this stored material varied greatly, as its grading depended upon the weather at the time it was quarried. In wet weather sometimes it had been necessary to send as coarse as ¾-in. material to the dump. This was all being worked up now, the washing plant being run at night on the reclaimed material.

### *Could Not Compete with Natural Sand in Chicago*

The following day Col. Chamberlain gave his experience with washing screenings to sand, and said:

"The company with which I am connected had a washer and washed crusher sand (we called it screenings, but I think crusher sand is a better name for it) and a good many years ago I tore the washer down and abandoned it, after it had been used a number of years. The Brownell Improvement Co., and the Consumers Co. of Chicago, both operate washers today. There is no question as to the desirability and the availability of the material produced, but in the Chicago district the producing of a yard of gravel results in the producing of two yards of sand, and every gravel producer has sand that he does not know what to do with. It is not a good business proposition, as I see it, to operate a plant of this kind in the district to compete with sand that is very often brought into Chicago and sold for the freight charges."

Col. Greene, chief highway engineer of New York state, said at one of the group meetings that New York was short of sand and said there was a good chance to make money by washing some of the great piles of screenings in that state to make concrete sand for highway purposes. In commenting on this N. C. Connors, engineer of construction of North Carolina said:

### *Mixing Sand and Screenings*

"It was said that New York State is short of sand. That is true of North Carolina. I have seen a man there pay $10 a ton for sand. They have to haul it a long way. If we knew what screenings would do it would help us somewhat. We do not know and we must find out. Research again comes in on that. We know mixing screenings with sand will often bring up the strength of the screenings. We know mixing screenings with sand will often bring up the strength of the sand. The tensile tests must be positive. In North Carolina we pass on sand and screenings by testing in compression and if the sample gets by it is suitable for the job."

Mr. Connors afterward remarked that the highway board in North Carolina permitted the use of mixtures of sand and screenings under certain conditions.

## Relation of Tests to Pavement Service

A paper on "Crushed Stone Tests and Their Relation to the Service of the Finished Pavement" was read at one of the highway group luncheons by A. T. Goldbeck, chief of division of tests, U. S. Bureau of Roads.

Mr. Goldbeck began by discussing the ordinary tests in use such as the Deval abrasion test, the Dorry hardness test, toughness test, cementing value test, absorption test and the newly devised accelerated soundness test. All but the last named have come to us from the time when stone was principally used for making macadam roads and some of the tests are now of no importance. Cementing value is now of little importance. An abrasion test is still needed because there is internal wear on the stone in bituminess paving and also because the aggregate must not wear faster than the mortar in concrete pavements. The toughness test has been supplanted by the Deval abrasion test because this test determines both toughness and abrasion. The Dorry hardness test has no significance now.

### *Soundness Test*

The accelerated soundness test has been developed to determine the effect of repeated freezing and thawing on aggregate. It consists of soaking the rock in a saturated solution of sodium sulphate for 20 hours and then drying in an oven. This is repeated five times. Rocks which are not durable under frost action will crack under this test.

Speaking first of bituminous macadam and waterbound macadam, which is probably to be covered with asphalt later, Mr. Goldbeck noted that economy entered into the problem and said:

"Here, good practice would not as a rule allow stone with a percentage of wear of more than 6. Economy demands that a softer stone be used in certain localities. For bituminous macadam a percentage of wear of more than 6 should not be used, for bituminous concrete, which ordinarily is of a more expensive type laid on a more expensive base than bituminous macadam, the percentage of wear should be not more than 5.0, and in order to reduce the liability of the stone to fracture, an additional requirement for toughness is used, the value for toughness being set at not less than 6.0. Instances are available where disintegration of bituminous concrete seem to have results from the use of too soft a stone. Many engineers specify a lower percentage of wear for trap or granite than for limestone for a given type of construction. The reason for this is that trap and granite are naturally more resistant than limestone so that granite showing a percentage of wear greater than normal for that type is likely to be partially disintegrated or of otherwise inferior quality even though the actual wear as shown by the tests is the same as the limestone. In connection with waterbound macadam construction certain types of rocks, such as quartzites, gneisses and schists, generally, cannot be used succesfully due to the difficulty of binding such materials."

Mr. Goldbeck next described the accelerated wear tests which were made by the Bureau of Public Roads. A synopsis of these was published in Rock Products, September 6, 1924. He then passed to the use of stone screenings, of interest to every crushed stone producer, and said:

### *Use of Screenings*

"While discussing the question of physical properties of coarse aggregate for concrete roads it will be well to consider the use of stone screenings as a fine aggregate in concrete. In general, stone screenings are characterized by the presence of an excessively large amount of dust and an excessively large amount of very coarse particles with a corresponding lack of particles of intermediate size when compared with the grading of good concrete sand. One of our tests for the suitability of fine aggregate for use in concrete is the so-called strength ratio test in which the tensile strength of 1.3 mortar briquets is compared with the tensile strength of Ottawa sand mortar briquets made at the same time. The ordinary assumption is that when these strengths are equal the sand is an excellent concrete material and in general this holds true. When the same test, however, is made with stone screenings it is almost invariably the case that the briquets made from stone screenings test higher than Ottawa sand briquets, but notwithstanding this fact, it is gener-

ally so that concrete with stone screenings as the fine aggregate is apt to have comparatively lower strength than where sand is used. Unfortunately it is also true, that in many cases where stone screenings have been used as the fine aggregate the concrete has not been resistant to the weather. Particular trouble has been had with limestone screenings, and no doubt this is true primarily because the concrete has been lacking in density due to the poor grading of the screenings. *I feel that if it were possible for crushed stone producers to turn out screenings with the same mechanical grading as a good grade of concrete sand there would be no question of their suitability for use.*"

The last part of Mr. Goldbeck's paper was given to the effect of different gradings of coarse aggregate on the workability of concrete, a subject on which even engineers are not well informed. In introducing this subject he said:

### *Coarse Aggregate Affects Water Ratio*

"There are very few engineers who realize the part the coarse aggregate plays in influencing the water content in a concrete mixture. Therefore the strength of the resulting concrete. Whenever the gradation of the coarse aggregate changes during the progress of the work this necessitates changes in the amount of water required to produce a given consistency of concrete. . . . For instance, a certain amount of water produced a slump of 3 in. when a ¼-in. to 2-in. normally graded aggregate was used, whereas exactly the same quantity of water produced a slump of 6 in. when the material between the ¼-in. and 1-in. screens was removed. On the other hand by maintaining a constant consistency, fully ½ gal. less of water per bag of cement was required when the stone was graded from 1 in. to 2 in. than when normally graded from ¼-in. to 2-in. In a 6-bag batch this would mean a change of 3 gal. in the measured water content and of course correspondingly a large difference in strength. Do you not see how producers of stone can aid in this movement for more uniform concrete by maintaining an absolutely uniform product during the progress of the work? The ideal condition, so far as the coarse aggregate is concerned, is that of uniformity of grading and this is an ideal which at the present time is not being generally attained. No doubt this is due in part to the present custom of screening aggregates at the producing plant and then more or less inefficiently mixing the various sizes together in a car before shipment. Possibly if more accurate methods were used for combining the screened sizes than those now used the desired results would be obtained. One possible solution for obtaining more uniformly graded coarse aggregate is that of shipping the screened sizes separately to the central proportioning plant, stock piling them there and later combining them in the desired proportions. It is recognized, however, as one of the difficulties in this proposal that ordinarily it is hard to find sufficient space to stock pile separate sizes and of course additional time is required to measure the sizes separately at the proportioning plant.

I leave this idea of uniformity with the producers. It is one which they should be prepared to meet."

Speaking of size requirements Mr. Goldbeck said:

"It would be ideal and highly economical if a definite standard of sizes could be set up which might be followed by the users of crushed stone. The road materials committee of the American Society for Testing Materials is now at work on the production of such a standard. The standard of sizes proposed by this committee which is designed to meet the requirements of the various types of construction now used is given in the following table: (The table given here was passed to the member.)

MAXIMUM PERMISSIBLE RANGE IN MECHANICAL ANALYSIS FOR EACH SIZE
(Percentage by weight passing laboratory screens)

| Designated Size, Inches | Diameter of Screen Openings—Inches | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ¼ | ½ | ¾ | 1 | 1¼ | 1½ | 2 | 2½ | 3 | 3½ | 4 |
| 0 - ¼* | 85-100 | 100 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 0 - ½* | 15- 75 | 95-100 | 100 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 0 - ¾* | 15- 75 | ..... | 95-100 | 100 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| ¼- ½ | 0- 15 | 95-100 | 100 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| ¼- ¾ | 0- 15 | 25- 75 | 95-100 | 100 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| ¼-1¼ | 0- 5 | ..... | 40-75 | ..... | 95-100 | 100 | ..... | ..... | ..... | ..... | ..... |
| ¼-2 | 0- 5 | 5- 25 | ..... | 40-75 | ..... | ..... | 95-100 | 100 | ..... | ..... | ..... |
| ¼-2½ | 0- 5 | ..... | 10-25 | ..... | 40-75 | ..... | ..... | 95-100 | 100 | ..... | ..... |
| ½-1 | 0 | 0- 15 | 25- 75 | 95-100 | 100 | ..... | ..... | ..... | ..... | ..... | ..... |
| ¾-1¼ | ..... | ..... | 0- 15 | 25- 75 | 95-100 | 100 | ..... | ..... | ..... | ..... | ..... |
| 1¼-2½ | ..... | ..... | ..... | ..... | 0- 15 | ..... | 25- 75 | 95-100 | 100 | ..... | ..... |
| 2½-3½† | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 0- 15 | 25- 75 | 95-100 | ..... |

*Designated Sizes 0-¼, 0-½, and 0-¾, when used as screenings in waterbound macadam road construction, shall conform to the following additional requirement: Passing No. 100-mesh sieve, 6-12%.
†The lower limit for Designated Size 2½ 3½ may be changed to 2-in., when necessary to utilize the product of a crusher producing Designated Size ¼-2-in.
The upper limit for Designated Size 2½-3½ may be changed to 4-in. in the case of very soft stone or light or porous slag.

"In conclusion, I would again emphasize the great need of your working to the end that the greatest possibly uniformity of product will be assured during the progress of any given piece of construction."

A criticism of these sizes followed, which indicates that many changes may be made.

## Highway Construction in General

EXCELLENT addresses were made on the general subject of highway construction by engineers who had been invited to address the convention either at general sessions or at some of the group meetings. One of the most noteworthy of these was made by A. R. Hirst, former state highway engineer of Wisconsin and now with the Vibrolithic Paving Co. Mr. Hirst has been a highway engineer since 1903. When he began his work there were only six states that had highway departments. Now highway engineering has grown from the least of all engineering professions to the greatest. The situation is somewhat appalling as compared with the settled practice of railroads, for example, since highway practice is still very much in the process of development.

He said that $250,000,000 is to be spent this year on a single type of highway, more than all states spent on all types of highways five years ago. And this is all to be spent by comparatively inexperienced men, for in less than 25 states the same man was in charge of highways last year who was in charge the year before.

What should be a high class engineering enterprise is too often spoiled by political influence. Highway building is an engineering and construction enterprise, and it can only be properly carried out by setting up an organization and paying a price for brains. Yet many of the men who are spending that $250,000,000 are getting only $6500 a year and $4 a day for sustenance when they travel. The highway engineers who get less than $5000 a year are greater in number than those who get more than that.

The business is so new that a boy now reaching his majority has seen all of its development. But all tax payers know more about road building than any highway engineer. And all of them want something. All material men want to sell something. The slag men want a differential against stone, the stone men against gravel and the gravel men against both of them. Mr. Hirst asked the members to be sympathetic with "the poor guy who temporarily sits in the seat of authority in road building."

Perhaps the most interesting part of his address was that in which he said boldly that the American people would have to make up their minds to higher taxes, the platform on which he ran his recent campaign for governor in Wisconsin. We cannot expect to run a government in 1925 on the scale of 1825. Our American standards of living call for more and more in the way of comfort and government cost must go up in proportion. "We havn't begun to build highways yet", he

told the members, "and if we build them we must be prepared to pay for them like men. The states that are putting off the building of highways are simply putting off the day of paying for them and they will pay for them at a higher cost."

Col. F. S. Greene, superintendent of public works in New York state, spoke at the banquet and in one of the group meetings on the general subject of highway building. Col. Greene is a frank advocate of reinforced concrete roads and said that he thought that these are all that a state should build, a conclusion that was not accepted by many of his hearers. At the group meeting he spoke of changes in the design of roads that made them safer to drive on, especially high banking on the curves.

Col. Greene is the inventor of the dual type road which is used to a considerable extent in New York. Where the state takes over an old bituminous macadam road it leaves a 9-ft. strip of macadam in the center and puts a concrete paving on either side. This type of road has been found to reduce collisions considerably.

R. M. Smith, material engineer of the highway department of Ontario was present at one of the group luncheons and gave some idea of highway work in Canada. He said the province did not begin to take over the road work until 1918 but now it has about 12,000 miles on its hands. They are now constructing roads which have a maximum grade of 7%, 30 ft. in width with 20 ft. of pavement in the center and a 5-ft. shoulder of either gravel or earth on the sides.

#### *Ontario Buys Highway Materials*

Washed and screened gravel are accepted on the same basis as crushed stone, but in 1924 purchases of crushed stone amounted to 300,000 tons, while only 100,000 tons of gravel were bought. The province supplies the materials delivering them at the nearest siding. There had been some question raised about that, but this method enables the small contractor to finance himself better and the material men are satisfied as they know they are going to be paid.

Last year the province constructed about 70 miles of concrete, 28 miles of bituminous macadam, 15 miles of asphaltic concrete and 7 miles of waterbound macadam. Eleven million dollars were spent and about the same amount would be spent this year.

L. A. Boulay, director of highways and of public works in Ohio, spoke at the banquet and at group meetings. He explained the present highway policy in Ohio, which is to build roads in stages, getting the people out of the mud first and then using the road of gravel or macadam as a foundation for a better road.

The talk given by N. C. Connors on highway work in North Carolina, in which he is engineer of construction, will be found under another heading.

H. M. Sharp who, alternately with Col. Chamberlain, had presided over the joint meetings of the highway and concrete aggregate groups, summed up the work of the meetings at the close of the last meeting. His talk was largely an explanation of the policy of Ohio in retaining other types of road than concrete, especially the bituminous macadam road, which he said had been tried and tested by very heavy traffic. He mentioned especially the roads around Columbus, Ohio, as examples.

## Competitive Materials

AT one of the highway group meetings a paper by Norman Kelb of the France Stone Co., Toledo, Ohio, was read which discussed very frankly the position of competitive materials with crushed stone, notably that of gravel. A part of Mr. Kelb's paper was as follows:

"A concrete road can be built of good quality, well graded, clean crushed stone or gravel. Crushed slag is not entirely satisfactory, on account of its large abrasion loss in the rigid types of pavement. Slag is a little uncertain. I do not think it is accepted yet that slag is entirely satisfactory for concrete work, although here and there some cases indicate that it might be used.

The strength of gravel competition will depend principally on two factors: First, the amount of sand in the gravel producer's pit; and second, the specification. The big problem for the gravel producer is to find a market for his sand, and the percentage of sand he is forced to waste depends on the amount of sand in the deposit and the amount permitted by the specification."

#### *Crushed Stone Men May Work With Sand Producers*

"It is this surplus of sand that runs up the most of producing gravel. You will find many gravel producers having a high percentage of sand in their deposits, anxious to co-operate with the stone man, in order that they can both compete with some other gravel plant, which has less sand to contend with. The crushed stone salesman should get acquainted with his gravel competitors and find out if their sand wastage is a serious problem, in his particular territory.

"Most specifications restrict the percentage of material passing ¼-in. screen, and say aggregate must be well graded from coarse to fine, but many are lax on naming the percentages of intermediate sizes. The crushed stone producer should advocate a rigid specification. The engineer, I am sure, will welcome this attitude on the part of the producer.

"In a gradation of sizes from 2-in. down, the ideal sizing would be a uniform mixture of intermediate sizes from ½-in. to 2-in, with no excess of any intermediate size. The intermediate gradation should be more specifically defined than is now the case, particularly in the amount of material passing the ½-in. screen. The stone producer is anxious to get rid of ½-in. down chips, in territories where there is a lot of concrete construction, and the gravel man also has a serious problem with his pea gravel. An excess of this fine material is harmful, and should not be allowed in any specification. Naturally, the producer will include in his aggregate, all of these chips and all of the ½-in. down pea gravel, if he can possibly get away with it. In this connection I want to quote from a letter from the state of Illinois, division of highways, H. F. Clemmer, engineer of materials, dated December 23, 1924. I would like to explain that Illinois specifications will not permit of more than 30% passing the ½-in. screen, and I wrote him asking him why he insisted on this, since most specifications say nothing about the ½-in. It is right on that point that the gravel men base so much of their argument. Here is what he says about that:

"'Before setting the limits of our present specifications for coarse aggregate, we conducted an extensive investigation in which hundreds of concrete specimens were made, including numerous possible gradations of coarse aggregate. The results of this investigation showed that the main factor in the strength of the concrete, in so far as the coarse aggregate is concerned, is a regular and uniform gradation from the largest to the smallest particle and that the maximum size of the aggregate does not determine the strength of the resultant concrete. That is, you may expect the same strength from a concrete made with aggregate graded 1 to ¼in. as you would from a concrete made from aggregate graded 3-in. down. In our investigation we also found that the amount of finer material passing the ½-in. sieve must be controlled. An aggregate of more than 30% passing this sieve, especially when used with a coarse sand, will cause a harsh, segregating concrete which is hard to finish. An excess of fine material passing the ½-in. sieve will also reduce the strength of the concrete.'

#### *Pea Gravel Must Be Wasted*

"A few weeks ago Mr. Taylor and myself happened to sit in with a meeting of about 20 gravel men over in Terre Haute and these fellows were complaining of the wastage of their ½-in. pea gravel. They were glad to ship into Indiana, because there they could throw all of that stuff in, and in that state some inspectors will object and some will not. In other words, they are getting away with a lot of stuff they should not be

able to get away with. It will hurt the stone men a little bit, but your competitor a little more. I have been emphasizing the sand and pea gravel wastage, in preparing concrete gravel, because that is the keynote to the whole competitive situation."

## Need of Research in Highway Materials

C. N. CONNORS, engineer of construction, North Carolina, spoke on the value of research in highway materials. He said in part:

"As a matter of fact, we do not know whether gravel or stone makes the best concrete. Some states put a premium on gravel to secure competition. Other states allow both to bid equally. We do not know; that is where reasearch comes in. You must help, engineers must help, everybody must help. Research is going to clear away all those doubts and present the facts to you in a condensed paper. What heretofore has been presented to you in thousands of words will finally be presented to you in hundreds of words.

"The very first thing I wrote down for this little talk today was: We need first, research along lines which will definitely show whether or not stone is better than any other coarse aggregate for different classes of work; and:

"Second, research that will allow the developing of the softer and more pliable stones for use as concrete aggregate or macadam bases, which may be used with either asphalt concrete, macadam, or whatever may be the best for that particular locality in which the road is to be built.

### *Development Roads*

"Roads must be made as development roads. You cannot go anywhere and build a road for thousands and tens of thousands of miles. The people have not the money. If you build a road that will carry the traffic this year, you must build a development road; you must let them wear out the roads they have. States which have been in the business for a good many years have had primarily stone roads. Lots of them have had gravel, but the hard surface roads have been of stone.

"Use of local materials: This comes into the specifications, whether or not we are doing the best we can with what we have. If we have a soft stone, it might be well to call for a larger size, so that when rolled and crushed under the roller, the voids will be larger than if you use a stone which is smaller and which crushes when rolled, filling up the spaces in which you expect to pour the tar on asphalt.

### *"Hard Boiled" Engineers Are Passing*

Engineers are beginning to realize that the hard boiled system is passing out. I am an engineer. The longer I live, the longer I work at engineering, the easier it is to see the other fellow's viewpoint. You must see the viewpoint of the contractor, the other fellow, or this road building game will fall through. Talk it over with the stone or gravel people, put in the specifications the gradation you want. Make them definite. You cannot get them too definite, but do the best you can.

"To sum up, I want to say, we must develop the use of local materials; we must build a development road to develop the community. You cannot look at it as a local problem, it is a national problem. To solve it we must all work together, and the National Research Council is going to try and summarize all of our ideas, all findings of tests, and turn it back to us in a condensed form so that you will not be bored in reading.

### *"Crusher Sand"*

R. W. Scherer would have testing done to show the value of "crusher sand"—more often called screenings—as fine aggregate. In one of the group meetings he said:

"With reference to crusher sand as I still insist on calling it, it is better than bank sand and always was. Those of us that sell to these concrete block makers know very well why they want it. We know very well why they use it. It is because they get along with 20% less cement.

"You must remember the less water you put into concrete the better the concrete. But you may have an aggregate that will require more water. In other words, you know that crusher sand demands 25% more water than bank sand because there are more surfaces, and you know that every test in briquettes has given 50% stronger concrete on an average than bank sand, and still 25% more water is used.

"Again I say, the less water you use, the better. But in this case the aggregate that required more water was the better aggregate. And there are thousands of block makers in the country that know it and some quarrymen that know it, and I think that the National Association is the place for this research. Absolutely the best field of usefulness for the National Crushed Stone Association is to conduct these tests and have them conducted."

The need of research, especially to show the advantages of crushed stone over other materials as concrete aggregate, was stressed several times during the convention. It was brought up both in the general sessions and at the group meetings. A. R. Hirst, former state highway engineer of Wisconsin, gave an excellent talk on the subject at one of the group meetings, in which he said in part:

"If the crushed stone producers of America desire and should have a differential as between stone concrete and gravel concrete, they have got to demonstrate that such a differential does, in fact, exist; and the only way that it can be demonstrated is by a high-class piece of experimental work. Now I will be very frank in saying (now that I am out of the public field) that I am firmly convinced in my own mind that concrete aggregate made of crushed fragments, where every fragment is crushed, and every fragment uniform, is superior to gravel, especially where the gravel contains a large percentage of round pebbles. There can be no doubt of it, but the evidence has never been presented to me; there is not in fact any investigation made in America, which proves that this is so. Where investigations have been made which might have proven that it is so, they have been made by other interests than yours, who, in order to keep peace in the family as between a client in the gravel field and a client in the crushed stone field, have either concealed the reports, or have given them out in such form that they could not be recognized.

"We found in Wisconsin, for instance, up in the Wisconsin River valley, where the best gravel is obtained, every fragment of which is either granite or some like formation, rolled by glaciers until it is almost polished, that if you put that in a concrete beam and test it for tensile strength, you get a modulus of rupture of about 200, as opposed to a rupture for a good crushed stone concrete of approximately 600. In effect, if we build a concrete road of a given strength of this special gravel, we would have to build it 5 in. thicker to get the same strength than we would have to build a concrete road of a good, crushed stone aggregate. Now these things are of great interest, and they bring me around to another point I want to to make.

### *Two 1-2-4 Mixtures May Vary 100%*

"I have been in this road game for 21 years. I have been a civil engineer since 1902. I don't know anything about concrete. Any man in this room who says he knows very much about concrete, has a very high opinion of his ability. It is a thoroughly unexplored field. The state highway department, city engineering departments, and even the engineers of private works, specify 1-2-4 mixtures, and that is the rule of the Medes and Persians. A 1-2-4 mixture does not mean a thing in the world, as compared to the characteristics of the sand, the gradation of the aggregate, the time of mixing and the amount of water put into it. The resulting strength of one 1-2-4 mixture, as compared with the strength of another 1-2-4 mixture, may vary as much as 100%.

"We have said a great deal about the sizing of materials. Reams and volumes have been consumed in determining the kind of sizing we should have in the aggregate in concrete, and then what happens? The plant sizes the aggregate, loads it into the car, it is unloaded with cranes, put on a

stock pile, dumped on top, the heavy stuff rolls down, the finest stuff stays in the middle, it is put into the trucks, and if you have the right mixture when it started from the plant, you could not recognize it when it gets into the batch box.

"We are spending annually $250,000,000 in the construction of concrete roads, and we are building all over America concrete roads which are sold as the same thing, which vary in strength, in basic load carrying capacity, as much as 100%. Illinois will build 1,500 miles of concrete road this year, and there will be roads all of the same types, all the same depth, there will be roads which will vary at least 100% in load carrying capacity. We have not even started. We need the highest possible class of engineering work in connection especially with this mixture of concrete in large masses.

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***Fatigue in Concrete***

"They found in Illinois, by a very valuable series of tests, that there is fatigue in concrete, provided that you load it anyways near its elastic limit. If, for instance, concrete is loaded in tension up to 75% or thereabouts of its elastic limit, it will disintegrate under a repetition of as few as 5,000 or 10,000 loads. If it is loaded up to about 50% of its elastic limit, it will stand from 25,000 to 50,000 loads. If it is loaded less than 50% of its elastic limit, the number of load repetitions it will stand without fatigue and without disintegration is practically infinite.

"What you are up against as as producers, without your knowing very much about it, or without the engineers seemingly knowing very much about it, is that we are buying 'pigs as pigs,' a 1-2-4 mix, regardless of the character, the gradation of the material or the kind of material. Pigs is pigs, and a concrete road is a concrete road, and yet the thing that we are buying for a given price may vary as much as 100% in strength.

"Now it is not the fault of the engineer, because he is operating in a very difficult field. Most states have producers of crushed stone and crushed gravel, the setting up of fine distinctions is impossible. We have the peculiar condition that there is no recognized test of gravel. It does not lay itself open to a test, so gravel is gravel, and yet it varies greatly. The strength of gravel concrete, in our experience at least, varies almost directly with the proportion of crushed fragments in the gravel. We have found in some cases that in order to get the reasonable depth of concrete in Wisconsin, we had to buy crushed stone and add it to the gravel before we used it in the concrete."

# Sales and Promotion

ALTHOUGH the National Crushed Stone Association has a research committee it did not function at this convention. Harry H. Brandon, of the Ohio Marble Co., Piqua, Ohio, chairman of the research committee, also chairman of the salesman's group meetings, however, introduced the subject of research at his meeting and it became the main theme of the two-days' session.

A subject for research and promotional activity suggested was the possibility of using screenings as a mat or foundation course under pavements and road surfacing (described in detail by C. D. Pollock in Rock Products, January 10, 1925, p. 58). Geo. E. Schaefer, General Crushed Stone Co., Rochester, N. Y., said: "We waste annually 50,000 to 60,000 tons of screenings. If we could find a market for these as a sub-base under pavements, such as I understand is being done in some states, it would mean a great deal to us." I. W. Wortman, Morris County Crushed Stone Co., Morristown, N. J., said that experience in New Jersey showed that trap-rock screenings did not pack well enough for this use, and that slag was usually specified.

The subject, "Does Road Stone Sales Require a Research Program Supported by the National Crushed Stone Association?" was introduced by Chairman Brandon, who said: "A committee is to be appointed by the association to bring out the superiority of stone over competitive materials. The most serious thing is the fact that competitive products are produced at a cost so much less than stone that it is important to meet their competition and we can only meet this by showing good reasons for the use of stone. No doubt each individual has some experience on this. Would your individual data carry the weight they should carry to engineers and other interested parties, or should a research program by this association be entered into? Is a research program a requirement of the sales group? Would it permit the salesmen more opportunity to go out and do actual selling if this was taken care of by a central organization? I have tried for four years to get this thing, but I could not sell anybody the enthusiasm to put up the money to start this plan."

To this Mr. Lindsay replied: "We consider crushed stone superior to gravel. I think the Pennsylvania Association has gotten out a good pamphlet on this. I believe a recommendation would be in order to have a copy of this pamphlet sent to each organization. This is entitled 'Crushed Stone for Permanence.' It has about 20 pages of comparative tests and photographs of roads that have been down ten years, and it is nicely worded and does not knock gravel."

L. C. Bonnell, of the Commonwealth Quarry Co., Summit, N. J., stated: "Perhaps it is not known that the Bureau of Public Roads at Washington conducted a series of wear tests on concrete roads. They have been running motor trucks over them with chains on the wheels. The tests are not yet completed. It seems to me that the result of that test, if favorable to crushed stone, will carry more weight with engineers than anything we could do. I think we would be justified in getting the official data which we feel sure must bear out our contention that crushed stone is the best. Rather than having a research bureau we should have a research committee that would keep in touch with those tests that are made by such official authorities and check up on the tests and do what we can to further our own interests."

Geo. A. McHaffie, of the Canada Crushed Stone Corporation, Ltd., Dundas, Ont., contributed the following: "I do not think there is anything more important than the research work. I think my experience with gravel and stone might be interesting. I tried to find out from every source the reason why one was as good or better than the other. I tried in Toronto, Cleveland, and New York and still I could not get an answer. Every specification read 'crushed stone or gravel.' In Hamilton I was able to put in 95% stone in place of gravel because I found that crushed stone is free from impurities. Gravel can be used when free from impurities. Crushed stone is free from impurities. There is not a contractor in Hamilton who is not using crushed stone now. We have done considerable work on this and the further I have gone into this I find this the correct aggregate."

***Secondary Highways***

The importance to the crushed stone industry of a well organized scheme for the development of secondary roads was emphasized by Chairman Brandon and several speakers. With primary road systems built by the various state highway departments largely of reinforced concrete, the biggest undeveloped market for crushed stone is for macadam roads of various types on secondary systems.

This seems to have been worked out in the Province of Ontario, Canada, to the advantage of all concerned. Wm. H. Lindsay, of the Canada Crushed Stone Corporation, Ltd., Hagersville, Ont., described this as follows: "In connection with secondary roads in Ontario within the last two years they have adopted this system. In the first place the state pays 80% of the township superintendent's salary. When you realize that the people in the outlying districts are just as anxious to get these roads as we are to sell, and that the state has given 80% toward this man's salary, they want this road superintendent to do something for his money. We are developing, as a result, a wonderful system of township roads that are being built to the rate of four miles per township per year. I believe this program is due to the fact that the state is aiding in paying the salary. They also pay 20% toward the cost of the road in the first

place. These superintendents are visited three times a year by an engineer appointed by the county, and they are trying to build the best type of road that they can. They are not building wide roads, possibly only 12 ft. of water-bound macadam. The state system at the present time is 1800 miles, of which approximately 75% is hard surfaced. That 1800 miles serve within seven miles 90% of the population of our province.

"There is no tendency away from water-bound macadam roads in so far as the counties are concerned. We use oil, but its use must be encouraged. Calcium chloride is used, too, but not to a great extent. Our road system has been in use two years. Prior to this we had the statutory labor system. The farmers gave so many days per year toward the upkeep of the roads. By the Department of Highways stepping in and taking control over the township road program there has developed a real system. Each township must have a paid superintendent at a minimum salary of $1800 per year."

### *Advertising*

Introducing the subject of local and national advertising, Chairman Brandon said: "Frankly, I do not think we are going to get far on an advertising campaign of this sort in this business at the present time. Crushed stone business problems at this time are the problems of production rather than distribution. Price has been controlled by the cost of production, and the cost of distribution and sales has not been given the consideration which it is given in other industries. When we talk about the value of an advertising campaign, we are talking about the cost of sales. I think the time is coming when this industry must adopt some sort of an advertising campaign, but I think this is premature now. Until prices can be increased no advertising campaign can be projected."

How research and advertising are linked together was brought out by R. D. Gordon, of the Gordon Crushed Stone Co., Toronto, Ont., who said: "It seems to me that you have the cart before the horse. I think you need research. I am surprised to come down from Canada and find an association of this size, that has the tonnage and the capital invested represented here, that has yet no definite organization to say just what it has to sell and why it is better than something else. To me personally, I would think that every member of the association could afford to contribute two or three times the amount necessary to be a member of the association just for the purpose of having such a department. I think until such time as you have that you are not functioning to the best of your ability. I am a new man in the producing business. I heard your remarks yesterday and said to one of your associates, 'Surely you have something or some central place where the members can go and get their own reports?' He said, 'No, they did not have such an information bureau.' I thought that was strange. In Canada we are all small producers. There is an organization there spending many thousands of dollars a year on research work. (It is the Canada Crushed Stone Corporation. Research work in Canada is carried on by individual operators, rather than by an association of operators.) I have thought it is worth considerable to me to belong to an organization where I could get the benefit of research work. I think when you get that it will be worth many times its cost to you.

"This thing will cost you $25,000 a year, but what is this when you have so large an amount of capital invested as you have in this business? Had this department been in action there is no question but that the crushed-stone business would be on a still better footing than it is."

Chairman Brandon brought the discussion

Harry K. Brandon

***Chairman, Sales Meetings***

to a close by aptly stating: "It seems as if this question of advertising has developed into a question of research. I cannot see the advantage of spending money for advertising until we have something fundamental to say. I wonder if it would be the opinion of this group to pass a resolution supporting research by the N. C. S. A?" The resolution was duly made, seconded, and unanimously adopted.

### *As to Association Bulletins*

In bringing the group meeting to a close, Chairman Brandon discussed the possibility of regular bulletins as follows: "Every one of you has a particular problem and finds a good way of solving it. This same problem may be that of another member, and he would be glad to know of your solution. If it is the sense of this group that you would as individuals interest yourselves in supplying material for a bulletin of this sort, I am sure it would go a long way toward putting this 'bulletin' service through. If desirable this subject might be placed in the hands of the resolution committee also. Bulletins 101 and 99 furnished a vast amount of information regarding the Kelly tariff which was an awakening to a great many producers and industries. I think it would be a good idea to make the bulletin a regular institution at stated intervals."

### *Winter Prices*

In nearly all published arguments in favor of winter construction work, the point is stressed that the prices of building materials are or should be less during the closed season. This is not and hardly can be the case with sand, gravel and crushed stone. A specific example was given by Mr. Wortman as follows: "We get more money instead of getting less or giving a discount during the winter. In our territory, we store sand during the operating season. We use a steam shovel in competition with the producers using dredges. They sell cheaper than we do, and we store our surplus. I would say that our cost of sand in storage is about the selling price of their sand during the operating season. As soon as the weather is as it is now, they stop producing. We are now selling our stored material for $1 a ton and the market price during the season is 30 cents. We sell dry sand. We have 15,000 to 25,000 tons of sand in storage and all we have to do is break the crust and get it. The same holds true of stone. We have a fixed charge of 20 cents per ton the minute the plant shuts down. We market as high as 40,000 to 50,000 tons of stone during the winter months. Mostly, this is for building construction. The building trade is the only operation during the winter months. Railroad and road building is shut down."

### *Moves for a Research Committee*

On the first day of the convention Norman Hely introduced a motion, which from the sales and promotional point of view may prove to be the most important action of the convention. This motion called for the formation of a committee to collect data favorable to crushed stone from all the various tests which have been made by highway departments, technical and government associations, and to bring this together in such a form that producers could use it for sales arguments.

In introducing his motion, Mr. Hely said in part:

"I believe that crushed stone is the best railroad ballast, the best concrete aggregate and the best road material. The gravel and crushed slag producers are not going to say this. Neither is the Portland Cement

Association, since it is the business of this association to sell cement and not any particular kind of aggregate.

"We believe this and we ought to say it, but there seems to be some question as to how we should say it. I think that we should get together and combine our reasons and make up a book. We could give this book out or we could keep it ourselves and read it and use it for sales arguments."

Following Mr. Hely's talk, the sales group at one of its luncheons and group meetings adopted a resolution to the effect that salesmen have not been furnished with sufficient evidence of the superiority of crushed stone. This resolution was read at one of the sessions by Chairman Rice of the resolutions committee and referred to the committee, which was to be apopinted, according to Mr. Hely's motion.

The appointment of such a committee was decided upon by a vote of the convention. President Graves announced that he would defer the selection along with the selection of the various standing committees until he had had time to confer with the executive committee.

# Stone for Railway Ballast

CONSIDERATION of the railway ballast branch of the crushed stone industry took up a considerable part of one of the general sessions of the convention, as two papers on the subject were read. The first of these was by J. V. Neubert, engineer of maintenance of ways, with the New York Central lines. Mr. Neubert evidently sees a considerable increase in the use of the better sorts of ballast, for he said, in part:

"We have our road beds and other equipment, but with the growth of the country, in order to serve our needs, the transportation condition has come to the point where we operate passenger trains which draw 900 to 1400 tons, at a speed of 60 miles per hour, and freight trains that draw 5000 to 8000 tons at a rate of 15 miles per hour or more.

"When the installation of a railroad is begun, it takes a country in its green state. We prepare the road bed and lay the tracks and ties and spike up the track, but the road does not develop into the final state until ballast is applied. It is, therefore, the last word in establishing and maintaining the true surface and line.

### *Why More Ballast Will Be Used*

You all know the principal kinds of ballast used, that is, cinders, sand, gravel, pulverized slag, crushed stone and crushed slag, but I imagine a number of you people who are in the crushing business do not know that ballasting in a general sense is in its infancy. I do not mean to be a prophet or an optimist, but I believe with increased axle, loading of motor power, and increased traction and with modern improvements, we are going to be able to impose greater traffic on our individual lines today than ever before. In order to meet this condition I believe substantial ballast such as washed gravel, crushed hard slag, and crushed stone will be used to a larger extent than before, because it makes a more permanent track. The amount and kind will depend on prices, location and earnings of the property. The reason for better ballast is that it affords better drainage, which is a big asset to maintenance of track. Also you can work track one to two months longer so as to perfect the true surface that will perform the service which is required of the trunk lines of this country.

### *Reasons for Specifications*

"The American Railway Engineering Association, as well as the majority of railroads in this country, specify that stone should pass through ring of 2¼ in. and lay on a mesh of ¾ in. I believe the rules have three conditions which are: first, regarding hardness, it must stand a knock; second size, and the third cleanliness. If you have foul ballast it is the hardest thing to correct after it has been established. When you realize that it costs as much as the initial cost of the ballast to correct the effect of foulness, you will understand why cleanliness is specified. I believe there should be closer co-operation between the producer and user and I believe that they should work closer with the American Railway Engineering Association in order to find out the requirements of ballast material.

"My word to you is not to wait until conditions are forced upon you. The railroads want to buy ballast from you. We want your business and you want ours. We want uniform size in ballast and clean ballast. What is the use of us taking foul ballast and applying it to the road bed and destroying that principal factor of maintenance, the factor of drainage."

## Value of Tests on Railroad Ballast

FOLLOWING Mr. Neubert, A. J. Simpson, chairman of the ballast committee of the American Railway Engineering Association, read a paper which went more deeply into the specifications for ballast and the method of applying tests on stone to find the best ballast. The part of his paper relating to specifications and tests follows:

"Our specifications fix tests for weight, soundness, toughness, wear and cementing value. Some of these may be classed as positive qualities and the others as general qualities. Weight is not a quality that has positive value. In general the heaviest stone is expected to have in highest degree those qualities that are positive, but, assuming that it has the requisite qualities, the lighter the stone the more attractive it is, for the reason that we buy ballast by the ton and haulage costs are measured by the ton. Soundness tests merely show whether or not a stone can be considered at all. So we have as qualities to which we may assign the term 'positive qualities,' toughness, (resistance to wear) and cementing value (minimum amount of). But what rank shall we give one of three materials, which is highest in toughness, lowest in wear and second in cementing value? It is entirely conceivable that of three available sources, tests may give each the highest index in some one of the qualities. How then can the prospective user tell which will make the best ballast?

### *A Formula for Ballast*

"The principles of a formula for such a purpose were developed in our own work some years ago, and a formula is incorporated in our instructions as to the selection of quarries from which to secure ballast. The values, however, used in putting that formula in use have not been definitely established, and it is recognized that the formula is subject to change as to the relative values that are given the various qualities.

"It is known that the toughness index for a very high grade stone may be as high as 30. It is generally considered that if the toughness index is below 6 the stone is unfit for use as ballast. The maximum index possible, and the minimum permissible may also be given for wear and cementing values."

Mr. Simpson then described the application of the formula. Perfect ballast was rated at 100 points and the least usable stone at 60 points. Put in a table form the qualities are rated:

| Quality | Perfect | Least Usable |
|---|---|---|
| Toughness | 45 | 27 |
| Wear | 35 | 21 |
| Cementing value | 20 | 12 |
| Totals | 100 | 60 |

The corresponding *list index* to the 45 points for toughness in the perfect ballast is 30 and for the 27 points in the least usable is 6. Hence a stone testing 18, halfway between 30 and 6, would be rated half way between 45 points and 27 points, or 36 points. The other ratings are figured from the test indices for wear and cementing value in the same way. Following this explanation he said:

"The only fly in our ointment is that we do not know just what point values to give to the various qualities when perfect, nor do we know just where in test indices we can go with each of the various qualities to reach the point where the stone should be considered the poorest usable. The values which are assumed, however, are thought to be close approximations of the correct values.

### *Finding Comparative Ballast Value of Various Materials*

"Another question that has been placed

before our committee for consideration is the comparative value as ballast of various classes of material. When this subject was suggested our committee was appalled at the immensity of the problem. It would be comparatively simple for a given railroad to institute the necessary records *on various* kinds of ballast and arrive at a decision as to which variety was most economical, but when you take into account that an answer applicable to the country as a whole is desired, you can realize that it is a real problem. We have made an attempt to get a start on the solution, but the problem is so involved that the only headway made has been to formulate some methods for collecting, and collating information with a view to establishing a basis for the answer.

***Best Ballast Depends on the Locality***

"It is possible if we are patient enough we will be able in time to tell how one may determine that, for instance, trap rock on a heavy trunk line in Maine, bituminous coal cinders in Illinois, washed gravel in Indiana, and anthracite coal cinders in Pensylvania, are most economical, or whatever is the correct rating, but I would not want any of you to hold in abeyance any important decisions awaiting that time.

"These problems of the committee on ballast are mentioned not that they are your problems in any sense, but because they are questions in the solving of which our interests and yours are interwoven. For the railroads to serve the public in the most efficient manner, they must have good track maintained at a reasonable cost. To have such track they must have good ballast. To get good ballast they must know what makes the best ballast. When stone is the best ballast they must know how to select the best that is available, and, in the final stage, must look to you gentlemen to give them that stone properly prepared which they have selected as best for their needs."

# Need of Local Associations

## Some Splendid Examples of Successful Ones

A MOST interesting session of the convention was the discussion of the aims, purposes, activities and usefulness of local associations. In introducing the subject, Geo. E. Schaefer, Rochester, N. Y., secretary of the New York State Crushed Stone Association, said: "Now what are local associations, and of what use are they, and what do they do? Local associations are members of stone companies banded together for common good, just exactly the same as this body. They may comprise firms in a single state, or include members from other states, depending entirely upon the circumstances involved. They usually meet at various places in their territory, at intervals, either monthly, quarterly or otherwise, and supplement such meetings with an inspection trip to one or more of the plants in the immediate vicinity. They discuss various means of improving conditions at this point, or learn from its operation how possibly their own quarry may be benefited. They obtain and absorb an increasing knowledge of their business from such first-hand information, which in turn is brought to this association for its own betterment.

***How Producers Co-operate***

"At certain intervals, meetings are held with the state, district or local officials who use our product. Aside from the value of such personal contact, it also enables the various producers to co-operate with these officials in arranging plans for a more comprehensive construction program, or for rendering more adequate service. By such action, the individual producer is benefited, and the local association, and consequently this association given added prestige.

"It is obvious that by reason of its scope, a national association such as this, cannot cover fully the many local phases of the most vital question of freight-rate inequalities. A local association accomplishes much good by handling such matter of a minor nature in its own territory. In questions of national import, it assists wherever action in its vicinity is involved, or where called upon for aid by this organization.

"In a standardization of sizes throughout contiguous territories, a most important and beneficial work, the local association has on numerous occasions been the deciding factor in successfully accomplishing the desired result.

"A local association ofttimes acts as a sort of clearing house for its members. You all know that some time or other, you have been in doubt about a certain piece of equipment, or have wanted to know where you could obtain the services of a good capable superintendent, shovel-runner or the like. Some one of our members can usually assist in such instances, and they always are glad to do so for the sake of the industry as a whole.

"Again, it occasionally happens that certain matters arise which are vital to each one of us, and of which we should all be notified. The local association gathers data on the subject and disseminates the information to its individual members. It keeps them advised of the developments of the case as they occur. It is needless to say that by doing so, we are in much better shape to act on such matters either individually or collectively as our local conditions may warrant.

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"Then there is the continuous personal contact among the members, and the fun of the gatherings themselves. Meeting on common ground, little difficulties are thrashed out and amicably settled. Petty jealousies disappear and good fellowship predominates at all times. The little fellow with his three hundred tons per day output is just as important as the big one with three thousand. The advancement of crushed stone and the local association, and resultantly of this association, is uppermost in the minds of all.

"Now just a word about our own New York state association. Since last February we have more than doubled our membership, and now have 43 names on our roster. We have met each month during the past year in different sections of the state, and have visited and inspected ten quarries and a sand operation. We have no initiation fee and no dues, and at the end of the year, share the nominal cost of postage, printing, telephone bills and similar sundry expenses. I do not believe that the assessment for each member during 1924 will exceed $5, and who will deny that the money is well spent. If you will pardon the suggestion, just let us assume that each state in the union had a local association, and while they may not all be as large as that in New York, let us assume that in each state the membership is twenty. You can readily see from this that the membership in the national organization would be nearer one thousand members than five hundred, and here we are with a present membership of approximately three hundred. The thought at least is worthy of consideration.

"In their own way, therefore, local associations are necessary and useful. Let us have them by all means, if for nothing else than to strengthen solidity and advance an industry that today is among those preeminent in North America, a highly important and basic occupation."

The discussion was lead by H. B. Allen, secretary of the Eastern Crushed Stone Association, Philadelphia, who among other things said:

***Association's Rise from Exigencies***

"In arranging the meeting of an association in the East during the past nine years to which has fallen my lot as secretary I have observed that when business is good and a period of normalcy exists only half-hearted efforts are made by the members to attend the meetings and there is an apparent lack of interest and enthusiasm. I have also observed that when an exigency arises, for instance, a proposed increase in freight rates, an unpected notice of curtailment or cancellation of a railroad ballast or road-building program, or possibly a suggested change in the specifications of stone by the engineer in charge of a large construction project, such as might tend to retard production and increase competition, there is an immediate reaction. The associa-

tion is spurred to great activity, a full attendance of the meetings is assured and there is a real live interest in the discussions and proceedings which gradually diminishes as the exigency passes. There is nothing uncharacteristic of many similar organizations in the recital of these circumstances and I am making no excuses for them, the point I want to stress is, does it not suggest significantly the "Need of Usefulness of a Local Association," and an apparently natural and rightful feeling of protection and security by such affiliation.

"There was organized a few years ago in the state of Pennsylvania an association of highway contractors which has been an influencing factor in no small degree in placing the contracting fraternity within its scope of activity on a higher plane. Of such value has this organization been to the state highway officials that due recognition is given to it as a point of contact between the department and contractors; and through this coordination many changes in highway specifications have been made, which were a distinct benefit to the department and which have eliminated some of the costly and perplexing problems the contractor previously had to contend with. It has also the effect, no doubt, of attracting bidders from a wider field to bid on state work. To show the trend along this line through the efforts of an association of contractors of national scope it will not be long before contractors bidding on state road projects in any state in the Union will bid under a standard uniform contract; and of particular interest to our members is the fact that this uniform type of contract will provide protection for payment for labor and materials.

### *To Render Service Must Act as a Body*

"To render the most useful service to the users of stone in the territory in which we operate, and provide adequate protection to ourselves, we must act as a body, which obviously can be done more forcibly and effectively than as individuals. Of great assistance can an organization of shippers be in the matter of procuring sufficient and proper aggregate to provide for the ambitious programs projected by many states for new road construction and maintenance, which are important and sometimes troublesome functions of highway authorities. It is unlikely that the highway department would change the specifications for cement without confering with the manufacturers—then why should there be any reasonable excuse to change the specifications for stone sizes without consulting producers to determine whether such changes could be made adaptable to their method of operation? If there was an organization comprised of stone producers shipping into that particular state to function and act as a point of contact between the shippers and highway department this would not happen. It would be the means by which the stone shipper could post himself and keep better posted on the constantly changing design of concrete road slabs and other surface types as it affects our industry. Should it not therefore behoove every quarryman to appoint himself a committee of one to start a movement to organize locally providing an organization does not already exist. The "Need and Usefulness" of which organization by reason of the service it can render through intimate contact with the authorities in charge of large absorbing stone markets will become immediately apparent.

"The National Crushed Stone Association has done much for the individual producers to make them recognize the importance of the industry, and it has done more to place the industry in a place where it should receive due recognition among established industries than it has been given credit for. Nevertheless it must not be forgotten that in our progress of uplifting the industry lies a mutuality of interest and corresponding obligation; so in the building and maintaining of the extensive system of railroads and vast mileage of highways, which must be accomplished in the future to keep pace with the trend of the country's progress every quarryman should consider himself part and parcel to this great movement, and espouse and further its purpose.

### *Can Aid Standardization*

"A local association can make progress toward a standardization of crushed stone sizes. For instance about five or six years ago when several of the Eastern States embarked on a comprehensive program to construct a system of highways, producers shipping into these states experienced much difficulty in preparing sizes to meet the varying and conflicting specifications of the different states. At a conference arranged through an association of stone producers in that region with representatives of the highway department from five eastern states, the difficult situation confronting the quarrymen was sensed by the highway authorities, resulting in an agreement as to a uniform standard of sizes for different types of road construction, due consideration being given in reaching this agreement and final adoption of the various sizes as would be best adaptable to the producer's method of operation. Moreover a wider range of sizes was allowed in the preparation of stone for concrete roads which latter type of construction comprised a large percentage of the projected improvements with a view of increasing the production of this particular size stone and reducing the cost. The standardizing of sizes was most helpful to shippers and there has been no change up to the present time.

### *The Oldest Crushed Stone Association*

"The Ohio Macadam Association, which is probably about the oldest stone organization in the country, was organized about 23 years ago, almost a quarter of a century, and was purely a social organization for a number of years," said Allen Patterson, the veteran quarryman from Findlay, Ohio. There were only five representatives present at the first meetings and when finally organized there were only seven present, but we learned a lesson of co-operation, and our numbers grew and our association gained strength and courage.

"A few years later we reorganized into a business organization employing a secretary, and opening up an office we operated in a business-like way from that time on. In making this venture we had to be as brave as was Christopher Columbus when he sailed the unknown seas and discovered America. Our faith in co-operation made us do it and since our association has been growing to such an extent that a great deal of benefit has been derived from that work for the entire stone industry.

"The organization has had much to do with framing road legislation and assisting in securing the proper legislation for the benefit of the great roads of Ohio. Our association has been invited to confer with legislative committees and help to write laws upon the statute books of Ohio. Team work among Ohio quarrymen made this recognition of our industry possible. At the present time, Ohio undoubtedly has more different laws which will provide revenue for state, county and township highway improvement, than will be found in any other state of the Union. We kept in touch with public men. We held meetings and banquets and entertained governors, U. S. senators, supreme court judges, legislators, newspaper editors, university presidents and agricultural leaders. Our program policies have been such that no man in public service had any fear or apology for being our guest. In fact, Ohio's most respected citizens felt honored to be invited to speak at our meetings. Co-operation has been our salvation in a state where both gravel and slag are strong and ever contending competitors.

### *Pioneer Work for Good Roads*

"One of our secretaries won national fame as a pioneer in the campaign for good roads. This man was Jesse Taylor. He was also the editor of the magazine, *Better Roads*. He personally visited nearly every state in the nation and carried the message to mud-bound communities, for a better day and a better highway. Since the death of Mr. Taylor in 1916, we

have had the services of A. P. Sandles, and the magazine that he now edits is known as "Macadam Service", which is mailed to a list of *ten thousand* well selected readers, who can infect whole communities with their opinions and convictions. Our Secretary has been a tireless worker and has done much to advance the cause of macadam roads.

"We have worked hand in hand with the state, county and other public officials for many years, by going before commercial clubs, farm meetings, teacher conventions, banker conferences and many state associations and presenting our cause in a frank and fearless way, endeavoring to promote the best possible roads that can be had for the least money and today the macadam road is the leading road of our state, there being nearly 9,000 miles of macadam roads, of which 3,000 miles are in the state highway system. The people of Ohio have voiced their sentiments of our policies by twice electing our present governor on a macadam-road program.

"Our association contact has made us better business men, both in buying what we need and in selling what we produce, selling macadam roads and more train loads of stone. In this way we have helped our industry in all its phases and made us proud of our business.

"Seven years ago, this month, it was our Ohio Association that called into conference, at Columbus, Ohio, the men from other states who have been the fathers and the founders of this splendid National Crushed Stone Association. We shall ever rejoice that we had a part in planting the acorn that has grown a nation-wide cooperation and acquaintance among quarry operators and our associate members.

"As a producer, the writer feels that our organization has done more to promote the cause of macadam roads and to promote the welfare of the stone industry than anything else and I believe that the education received through the various conferences is worth more to the producer than the cost of maintaining the organization, through its influence in promoting a better understanding of the production and sales of our product in general."

Geo. H. Balfe, of the Indiana Crushed Stone Association, spoke in general terms of the great value of organizations of producers within an industry.

# Accident Prevention and Employes Liability Insurance

ACCIDENT prevention is a hobby with C. M. Doolittle, president of the Canada Crushed Stone Corp., Ltd., who contributed some valuable thoughts on the subject. We quote from his remarks as follows: "In choosing my subject, I had in mind the great importance of safety in the various plants coming under this association and I would ask you to remember that safety is a fundamental of any business. Personally, I have always been a great believer in accident prevention and have endeavored to the best of my ability to instill the same belief into the minds of my friends and all of our employees.

"With this in mind, I was instrumental in having a Safety First Committee organized at the Dundas quarry in May, 1917, following which five meetings were held. This committee functioned satisfactorily until January, 1919, when a new committee took charge and nine meetings were held during that year. Following this, new Safety Committees were formed in August and December, 1920, and May, 1921, the latter committee holding office until April, 1924. Inspections of the plant were made each month and the interest of our employees was continued from year to year. For this reason we decided, in 1924, to stimulate this interest by offering cash prizes to the value of $100.

"Our employees were divided into four teams with a captain to each team. With the exception of a serious accident which occured on August 25, 1924, when five men were injured, our accident record shows how successful this cash inducement has been. In addition to the cash prizes offered in 1924, we had two of the inspectors of the Industrial Accident Prevention Association address a full meeting of employees and those of you who have had a similar experience know the great value of bringing in outsiders to address your men.

"The Industrial Accident Prevention Association is an organization formed under the authority of our workmen's compensation act in the Province of Ontario and exists for the purpose of preventing accidents and so lowering compensation costs. The organization has been very successful and I want later to refer again to it.

### *Safety Bulletins*

"Our employees have taken great interest in the safety bulletins which we have posted in various parts of the plant and, in addition, safety slogans were painted in places where they would be noticed by the men. All together, we regard last year as quite the most successful so far as safety work is concerned in the history of our company; and it is, I hope, the forerunner of many more successful years. The following figures will interest you as showing the number of accidents on which compensation was paid in the last three years. 1922—38 accidents; 1923—50 accidents; 1924—20 accidents.

"Under our workmen's compensation act in Ontario, we have a system of merit rating refund and I am very glad to be able to say to you that one of our plants received for the past three-year period a refund of $1,974.51 from the workmen's compensation board. This, I think you will agree, is a very strong incentive to accident prevention work entirely apart from the fact that accidents are costly in other ways.

"The general experience of the crushed-stone industry under the Ontario compensation act has not been good, the following rate per $100 of pay roll having been paid in the years mentioned: 1918—$6.00, 1919—$4.00, 1920—$6.00, 1921—$6.00, 1922—$5.00, 1923—$4.00, 1924—$4.75. This latter being an estimated rate and subject to reduction when the full experience of 1924 is known by the Workmen's Compensation Board. This adjustment will take place in about two months and we have every hope and expectation that it will be reduced from the figure provisionally set.

"I think it will probably be of interest at this time to touch on the personal aspect of accident prevention. I refer to the Industrial Accident Prevention Associations, which organizations represent over two-thirds of the total pay roll under compensation in our Province. The chief reason for the existence of the associations is that it is cheaper to prevent accidents than it is to compensate for them. I have been in intimate contact with the associations for a number of years and have been a director, watching with pleasure the growing interest of the average employer in accident prevention.

### *Accident Prevention Association*

"The Industrial Accident Prevention Associations is a federation of an even dozen safety associations representing various classes under the workmen's compensation act. The association for our own class (Class 6) is known as the Ceramics and Stone Safety Association. As I say, I was a director of this for a number of years and, two years ago, was elected Vice-Chairman and last year, at the annual meeting, elected Chairman. I find that my own interest in the work has developed considerably and I believe that we are doing a very great deal of excellent work for the employers in our class.

"You will understand of course, that the functions of the Ceramics and Stone Safety Association are limited to accident prevention but because of the close contact which we maintain with the Workmen's Compensation Board we are enabled to put employers in the various classes in possession of a great deal of information that is of value to them.

"The Industrial Accident Prevention

Associations maintain an efficient staff of inspectors whose duties take them into thousands of plants every year in Ontario and, in addition, the Associations distribute safety bulletins, safety calendars and other forms of safety propaganda every month to nearly 7,500 employers. Our act in Ontario contains a provision in Section 101 authorizing these safety associations and I call this matter to your particular attention as I am informed that no act in the United States has a similar provision. We employers in Ontario find that the addition of this section to our workmen's compensation act is well worth while and works out to the benefit of both employer and employee."

*James Savage, Treasurer, N. C. S. A.*

## Possibility of Mutual Insurance Companies

THE general feeling on the part of quarrymen that their rates for employers' liability insurance are higher than they should be was crystallized by Bruce Dodson, insurance broker, of Dallas, Tex., who argued in favor of the formation of a mutual insurance company, or the placing of the insurance of a large number of quarry operators as a single group at special rates. He said:

"The establishment of an insurance company for yourself would necessarily be gone about as follows: You would provide a sum in cash, or financial backing sufficient to guarantee the solvency of your company, and that all losses which might occur would be promptly paid. You would find it necessary to establish offices, to develop legal and medical services in every locality where there was a policy holder. It would be necessary to develop and train underwriters, inspectors, safety engineers, clerks and so forth. It would be necessary to secure licenses in the various states—which latter matter is one involving much delay, difficulty and expense.

"It would be necessary for you to secure certain reinsurance contracts whereby you could protect yourselves against the catastrophe hazard in the event of any accident which might destroy a number of lives or injure a number of people in one accident. It is the custom of most insurance carriers to hold reinsurance contracts protecting them up to $500,000 for any loss in excess of $25,000.

"The above is only the skeleton of the organization which would be necessary. Many other details involving expense, trouble, time and effort would be necessary.

"Having established your own company, as indicated above you pay your premium into it at the same rates you would pay to a public company, out of these premiums the losses and expense would be paid and a reasonable amount set aside from any savings effected, as surplus, to meet possible higher loss ratios during any future period. The amount remaining would of course belong to you, the owners of the company and be returnable to you as savings.

### *Inspection Service Most Important*

"I come now to the important part in connection with the establishment of your own insurance company. The saving you may affect is really the matter of smaller importance. You will come to find that the real value of your own insurance company is that you will be able to secure technical inspections and engineering service, developed to meet your need and requirement and you will have an insurance company of your own through which you can develop for yourselves every kind of service which you may wish it to give and to secure this because you own the company.

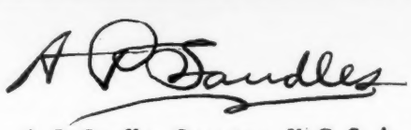
"Industries which have their own insurance companies consider the value of the elimination of accidents and of the special service they secure as of much more importance than the saving effected and would maintain their own companies even though they effected no saving. But by adding to this fact the other fact that they are actually saving a large portion of their premium you can readily see the advantages of an industry insurance organization."

# Social Side of the Convention

SOCIALLY the convention was the success that conventions of the National Crushed Stone Association always are. A smoker was held on the evening of the 12th in the ball room of the hotel and the entertainment was provided by the Ohio producers who are members of the association. Motion pictures were followed by vaudeville and some lively boxing bouts.

Three hundred plates were laid for the banquet and many ladies were present. Otho M. Graves was toastmaster and his introductions of the speakers were full of pleasant humor and not too long. George Otis Smith, director of the U. S. Geological Survey, made the first speech. It dealt mainly with the growth in importance of the rock products industries, which now "take up most of the picture," while the production of the "noble metals" has sunk into insignificance. The most interesting point that he made was that the consumption of rock products does not increase with the increase in population but with the increase of civilization. The higher the civilization the greater the consumption of such materials as cement, lime, gypsum, crushed stone and sand and gravel.

He was followed by C. J. Brister, assistant vice-president of the New York Central Lines, who told the members of the association that theirs was the one industry that would never run out of raw material since they could "go on crushing until there was just standing room for the last man as he heaved the last chunk of granite into the jaws of the crusher." Much of his talk was on the relation of trucks



*A. P. Sandles, Secretary, N. C. S. A.*

on the highways and railroads, but he said that the problem this competition presented was already working itself out.

Col. F. S. Greene, director of public works in New York, gave a very good talk on the relation of road building to the development of the state. Myers Y. Cooper, a banker of Cincinnati, spoke on home building and the relation of the highways to the building up of new districts. L. A. Boulay, director of highways in Ohio, spoke of the Ohio pragram which aimed primarily to get people over through roads. He mentioned one county in which conditions at times were so bad that people could not get in or out of the county seat and urged the necessity of highway building according to a developed plan of connected routes.

Others who sat at the speakers' table were:
President John J. Sloan, Treasurer James Savage, Ex-President John Rice, Ex-President W. Scott Eames, Ex-President F. W. Schmidt, Chas. M. Doolittle; H. F. Janda, Highway Research Board; Howard E. Bair; A. R. Hirst, former State Highway Commissioner, Wisconsin; C. N. Connor, North Carolina State Highway Commission; N. S. Greensfelder, Chairman, Manufacturers' Division; R. N. Harry, Treasurer, Big Four Railroad; Hon. R. M. Smith, Highway Engineer, Province of Ontario.

# Exhibits of Manufacturer's Division an Attractive Feature

EXHIBITS ranged from catalogs and bulletins to models of complete plants, and a large number of the exhibitors gave many valuable souvenirs to the members of the

*Elected Director of National Crushed Stone Association*

association. The guessing contest, conducted by the **Marion Steam Shovel Co.** of Marion, Ohio, on the tonnage of shovels sold by that company during the year 1924 was especially interesting. A large diagram of a shovel covered with dots was prominently displayed in the booth, and members of the association (active) were asked to guess the number of dots. Each dot represented one ton of shovels sold. Prizes ranging from a suit of fine clothes to a silk scarf were awarded to the winners. Ten prizes in all were given, the winner being Allen W. Gehman, with C. O. Hunsecker of Allentown, Penn. His guess was 4815, the correct figure being 4783 tons.

The following manufacturers were represented in the exhibit:

**The Thew Shovel Co.,** Lorain, Ohio, which showed bulletins featuring the new center drive for all ¾-yd. machines. The entire line of shovels was presented by attractive descriptive bulletins. B. E. Onskt, Chicago, S. R. Horner, Lorain, and R. H. Wilson, were in charge of the display.

**The Easton Car and Construction Co.,** Easton, Penn.—The feature of this company's display was a large board containing 12 photographs, arranged in the form of a clock. Each photograph represented some use of the company's products, which include industrial cars of all types, and special installations of retailers, and dump-body trucks. The company distributed novel registered key rings. Those representing the company were W. E. Farrell and G. D. Fraunfelder of Easton, Penn.

**The Morgan Engineering Co.,** Alliance, Ohio—A small electrically driven model of the Weston direct-drive gyratory crusher was prominently displayed. The exhibit also included bulletins describing the crusher, overhead cranes, and the company's other products. The exhibit was in charge of A. T. Davis, Alliance, and R. R. Glover, Cincinnati.

**The Flexible Steel Lacing Co.,** Chicago, Ill.—This company which manufactures belt fasteners for all types of belting, including transmission and conveying belts, showed samples of their various products, and photographs of installations in the field. They also had on display their line of lamp guards. Wm. J. Young, Birmingham, Ala., and James S. Fitzgerald,

*Elected Director of National Crushed Stone Association*

Columbus, Ohio, were in charge of the display and distributed registered key rings to those present.

**The Hercules Powder Co.,** Wilmington, Del. — This company showed samples of their line of blasting powder, dynamite and blasting accessories. Representatives of the company presented included N. S. Greenfelder, Wilmington, Del., S. A. Johnson, New York City, J. Barab, Wilmington, J. I. Horty, New York, W. J. Austin, Chicago, Wm. A. Anderson, Buffalo, N. Y., W. F. Gainty, Chicago, R. J. Brodhead, Chicago, W. B. Lyon, Pittsburgh, Penn., C. C. Gerow, Wilmington, I. Keane, Columbus, Ohio.

**The Loomis Machine Co.,** Tiffin, Ohio.—The display of this company was especially interesting. Photographs and models showed the development of the rock drill industry from 1842 down to the present time. The exhibition included some of the first drills and drilling accessories manufactured by the company, and by comparing them with the present-day machines one could really appreciate the tremendous strides which this industry has attained during the last 50 years. D. L. Lott designed the first drill that the company manufactured in 1876, and he is still with the company in the capacity of superintendent. In addition to Mr. Lott, the company was represented by J. Reynard, C. A. Riggs, and

*Looking down left entrance aisle*

*The center aisle of exhibit*

*The right aisle of the exhibit*

*The left aisle looking toward entrance*

*The center aisle from the far end*

*Looking back along the right aisle*

The Manufacturers' Division Exhibit at the National Crushed Stone Association Convention, January 12-15

Charles C. Hale, all of Tiffin, Ohio. Reel tapes, 25-ft. length, were distributed as souvenirs.

**The Keystone Lubricating Co.,** Philadelphia, Penn.—Two excellent models were featured in this exhibit. One showed the action of the company's line of liquid greases in a circulating pump, the oil flowing into a tank surrounded by ice, and the other showed the Keystone safety lubricating high-pressure system for the lubrication of a group of bearings from one central point. Photographs of various installations and sample greases from the company's line were also shown. The exhibit was in charge of F. D. Street, K. K. Buzby, H. A. Buzby, J. H. Verkes, G. W. Hall, Phil King, L. L. Lacey, Peter Cassady, and Oliver Bennett, all of Philadelphia.

**The General Electric Co.,** Schenectady, N. Y.—A large board of photos showing installations of the company's line of products in the quarry field was featured. A new bulletin covering industrial haulage in which electric locomotives, both trolley and storage battery, were explained, was distributed to all those interested. The exhibit was in charge of L. W. Shugg, and E. W. Pilgrim, of Schenectady, N. Y.

**The Geo. D. Whitcomb Co.,** Rochelle, Ill.—This display was in charge of S. S. Swasey, of Rochelle. It included photographs of installations and bulletins showing the line of locomotives manufactured. Leather-bound memorandum books were distributed.

**The Smith Engineering Works,** Milwaukee, Wis.—The feature of this exhibit was a working model of a complete crushing and screening plant, electrically driven. It included primary and secondary crushers, bucket elevators, scalping and sizing screens and bins. D. D. Barnes, New York, S. A. MacIntosh, Milwaukee, and Victor H. Jones, of Chicago, were in charge.

**Fairbanks, Morse and Co.,** Chicago, Ill.—The ball-bearing dust-proof motor, one of the features of this company's line of products was displayed. In order to demonstrate the features of this motor, a section of it was cut away and exposed. It was driven by a fan motor. Bulletins showing the other products of the company were also displayed. The booth was in charge of H. V. Hodge, of Cincinnati.

**The Hill Clutch Machine and Foundry Co.,** Cleveland, Ohio—A composite full-sized unit showing practically all of the company's line of products including a spur gear reducer, automatic belt tightener, and friction clutch all driven through one motor was the feature of the display. They also displayed a small model of the gear speed transformer, and bulletins. The exhibit was in charge of E. A. Smith, of Cleveland.

**The Austin Manufacturing Co.,** Chicago, Ill.—O. E. Thaleg, of Chicago was in charge of this display which included catalogs, photographs, and late bulletins of the company's line, of interest to stone producers.

**The Bucyrus Co.,** South Milwaukee, Wis., displayed large photos of installation in the industry, also bulletins on the various types of shovels and excavators manufactured. The display was in charge of Mark J. Woodhull, Chicago, E. G. Lewis, New York and E. E. Pollock, South Milwaukee, Wis.

**The Frog Switch and Manufacturing Co.,** Carlisle, Penn.—J. S. Morrison, Pittsburgh, H. A. Johann, and J. G. Johann, of Chicago, were in charge of this exhibit which included models of reversible dipper teeth (manganese) and bulletins of the company's products. Memo pads and calendar blotters were distributed.

**The Allis-Chalmers Manufacturing Co.,** Milwaukee, Wis.—A large stand of photos, showing installations of crushers, screens, motors, pumps, etc., was the feature of this display. It was in charge of J. M. Johnson and B. McGrew, of Chicago, and J. S. Bond, of Milwaukee.

**The American Manganese Steel Co.,** Chicago, Heights, Ill.—Samples of the line of manganese steel parts including buckets, chains, dipper teeth, and a wooden model of a dredge pump were shown. J. O. F. Clark of St. Louis, and Bradley Carr, W. G. Broughton, of Chicago Heights, represented the company.

**The Fate-Root-Heath Co.,** Plymouth, Ohio—Bulletins describing the Plymouth line, and featuring the new 18-ton standard-gage gasoline locomotive were displayed. The exhibit was in charge of G. G. Stein and H. R. Sykes of Plymouth, Ohio.

**The Osgood Co.,** Marion, Ohio—Earl C. Smith and H. W. Davant of Marion, and Chester Phillips and Frank D. Manning, of Chicago, represented Osgood at the show. Exhibit included photographs of installations and bulletins.

**The Atlas Powder Co.,** Wilmington, Del.—Atlas exhibited samples of their line of blasting equipment and accessories, also general catalogs. The exhibit was in charge of A. A. Mellin, Howard Sergent, and C. E. Clifford, all of Pittsburgh, Penn.

**The Harnischfeger Corp.,** Milwaukee, Wis.—This company, which has recently changed its name from Pawling & Harnischfeger to the above, showed motion pictures of installations. The feature of the film were views of a P & H machine moving itself through a river bottom for a distance of several miles to a certain dam job. In some places water covered the entire traction wheels of the machine. It was in charge of M. B. Bradley, of Pittsburgh.

**The Jeffrey Manufacturing Co.,** Columbus, Ohio—The company displayed a model pulverizer, and samples of chain and conveyor idlers and pulleys. They also showed a number of photographs of installations. Exhibit was in charge of J. T. Fowler, and G. D. Francisco, of Columbus, Ohio.

**The Symons Brothers Co.,** Chicago, Ill.—This exhibit in charge of J. M. Thistlethwaite, Milwaukee, L. D. Hudson, New York, O. Gruender, Milwaukee and Geo. Marsh, Chicago, featured a small model of a Symons horizontal disk crusher, and bulletins describing the line.

**The Columbus-McKinnon Chain Co.,** Columbus, Ohio—The exhibit included cross-sections of links of chains of various sizes for steam-shovel work, and bulletins describing them. Nickel-plated chain links to be used as paper weights were distributed by O. H. Hager, Columbus, Ohio, who represented the company.

**The Taylor-Wharton Iron and Steel Co.,** High Bridge, N. J.—Manganese steel castings, chains, and dipper teeth were displayed, also catalogs of the various products. C. B. Andrews, of High Bridge, and C. T. Ramsey, St. Louis, were in charge.

**The Williams Patent Crusher and Pulverizer Co.,** St. Louis, Mo.—The feature of this exhibit was a model hammer mill and feeder, electrically driven. A. E. Schneider, of Chicago, was in charge.

**The Armstrong Manufacturing Co.,** Waterloo, Iowa—A small working model of their steel blast hole drill was on display, and a model of the drill sharpening mechanism which they have recently developed. The second model consists essentially of a jig device for firmly holding the drill bit in place while it is automatically forged and sharpened. Bulletins of the company's products and samples of drill steel, and drilling accessories were also displayed. The company was represented by Geo. G. Armstrong, G. E. Armstrong, G. R. Watson, F. J. Schomer, O. M. Cavin, and E. A. McElroy, all of Waterloo.

**The Inland Engineering Co.,** Chicago—This exhibit included manganese steel castings, chains, plates, etc. They also showed bulletins describing the line. E. S. Black, and Kenneth Jensen, of Chicago, were in charge.

**The Kennedy-Van Saun Manufacturing and Engineering Co.,** New York, N. Y., exhibited working model of the ball-bearing gearless standard crusher manufactured by the company. Also a large drawing of the machine, photographs of the plant and installations and general literature. It was in charge of Wm. Jennings, Pittsburgh, and C. B. Scott, New York.

**The Robins Conveying Belt Co.,** New York, N. Y.—An idler which has already conveyed 5,995,453 tons of stone (18-in. and under) with no lubrication was the feature of this display which also included other full-size idlers. Dislay also included working models of "Grasshopper" screens and "Cataract" grizzly. It was in charge

of Thos. Robins, Jr., New York, and E. R. Morgan, Pittsburgh.

**The Hadfield-Penfield Steel Co.**, Bucyrus, Ohio—The exhibit included manganese-steel castings ranging from small detachable link chains to parts for large steam shovels and crushers. S. F. Virtue, and N. Whitcraft of Bucyrus, Ohio, represented the company.

**The W. S. Tyler Co.**, Cleveland, Ohio—Various sizes of woven-wire screens were attractively displayed, also literature concerning the "Hummer" electric vibrating screen. J. H. Jackson, Chicago, and A. E. Reed and H. F. Pierson, Cleveland, were in charge.

**The Orville Simpson Co.**, Cincinnati, Ohio—Blueprints and literature describing the new "Rotex-Jumbo" screen were exhibited. Due to the large size of the machine, and the impracticability of displaying it here, the company provided transportation to the plant for all those interested. John Schott, Hugh Garvin, Orville Simpson, Lowe, Simpson, all of Cincinnati, represented the company.

**The Koehring Co.**, Milwaukee, Wis.—The feature of this exhibit was the motion-picture display of cranes and shovels. A large book of photos showing many other installations was also on display. Souvenir canes were distributed. Vernon Clarke, Milwaukee, was in charge.

**The Hendrick Manufacturing Co.**, Carbondale, Penn.—A complete line of perforated metals for screens was displayed. The exhibit also included their "Mitco" grating and stair treads. B. G. Shotton, Pittsburgh, B. C. Dann, represented the company.

**Earl C. Bacon, Inc.**, N. Y.—A wooden, working model of the new "Farrell" Style D stone and ore crusher, which is a jaw crusher of recent and unique design was displayed; also literature. Young, New York, was in charge.

**The Marion Steam Shovel Co.**, Marion, Ohio—In addition to the guessing contest, mentioned before, the display included photographs of installations, and general literature. Memo books, pencils, and steel pocket rules were distributed. Harvey T. Gracely, F. B. Tetzel, E. R. Wilson, J. C. French, Arthur E. King and Homer Littlefield of Marion, and D. L. Cheney, of New York represented the company.

**The Quaker City Rubber Co.**, Philadelphia, Penn.—The complete line of rubber products which this company manufactures for the industry was exhibited, and it included rubber hose of all kinds, packing, conveyor and transmission belting. Literature describing the products was also displayed. W. Trunnel, Cincinnati, was in charge for the company.

**The Sanderson-Cyclone Drill Co.**, Orrville, Ohio, displayed a working electrically-driven model of their machine, also photos of installations and numerous samples of the types and kinds of rocks which the machine has often drilled. "Plymouth" manila drilling rope which the company handles was also displayed. In charge were M. B. Garber, K. O. Crum, and J. N. Rose, all of Orrville.

**The E. I. duPont de Nemours Co.**, Wilmington, Del.—The exhibit included the complete line of blasting tools, supplies, and accessories which the company manufactures, also general catalogs. Blasters' handbooks and leather memo books were distributed at the booth, and Eversharp pencils at the banquet. S. R. Russell, Wilmington, R. H. Summer, St. Louis, H. H. Hamilton, Pittsburgh, J. C. Ahl, Lima, Ohio, and J. E. Orr, Lexington, Ky., represented the company.

**The American Hoist & Derrick Co.**, St. Paul, Minn., showed photographs of installations of their cranes and shovels

***Exhibit of Manganese Steel Forge Co.***

in the field, also descriptive literature. W. M. Schoen, Indianapolis, was in charge for the company.

**The Graham Coal Co.**, Philadelphia, Penn.—The display included samples of coal with analysis of contents in each case. A handbook giving valuable coal data was distributed by R. B. Graham, Philadelphia, in charge for the company.

**The United States Rubber Co.**, New York, N. Y., featured a small model of a bucket elevator equipped with United States conveyor belt, and the patented "Stephens" belt protector. This protector was patented by the Doolittle-Stephens Co. of Hagersville, Ont., and that company's literature was also on display. The U. S. line of conveyor and transmission belting was also exhibited.

**The Pennsylvania Crusher Co.**, Philadelphia, Penn., showed photographs of installations and literature describing their crushers. C. S. Darling, Chicago, represented the company.

**The C. G. Buchanan Co.**, New York, N. Y., exhibited installation views of their machines and bulletins on the types of crushers and magnetic separators which the company makes. G. W. Flounders, New York, represented the company.

**The Manganese Steel Forge Co.**, Philadelphia, showed samples of all their products of interest to the field including manganese screen cloth, forgings, balls for ball mills, elevator buckets, etc. The "Rolman" line of manganese steel products featuring the new "Rolman" double-lock mesh woven manganese steel screens, made of rolled manganese steel rods was featured. L. W. Jones, of Philadelphia, and H. A. Johann, Chicago, were in charge.

**The Hayward Co.**, New York, N. Y., showed bulletins and literature. H. M. Davidson represented his company.

## Registration of Members and Guests

### ACTIVE MEMBERS

The American Crushed Rock Co., Cleveland, Ohio.
H. Schmidt, Cleveland, Ohio.
A. Bushman, Delaware, Ohio.
American Lime and Stone Co., Bellefonte, Penn.
G. I. Purnell, Bellefonte, Pa.
C. B. Nicholson, Bellefonte, Penn.
American Limestone Co., Knoxville, Tenn.
Vernon Smith, Knoxville, Tenn.
Acme Limestone Co., Alderson, W. Va.
J. A. Rigg, Alderson, W. Va.
C. C. Beam, Melvin, Ohio.
Blue Ridge Stone Corporation, Roanoke, Va.
L. J. Boxley, Roanoke, Va.
Bluffton-Lewisburg Stone Co., Findlay, Ohio.
Allen Patterson, Findlay, Ohio.
Fred Patterson, Findlay, Ohio.
Edgar Files, Findlay, Ohio.
O. A. Scott, Findlay, Ohio.
F. A. McElroy, Bluffton, Ohio.
L. E. Patterson, Findlay, Ohio.
W. R. Althaus, Lewisburg, Ohio.
Bound Brook Crushed Stone Co., Bound Brook, N. J.
Chas. V. Higgins, Bound Brook, N. J.
Wm. H. Haelig, Bound Brook, N. J.
Buffalo Crushed Stone Co., Buffalo, N. Y.
James Savage, Buffalo, N. Y.
A. J. Hooker, Buffalo, N. J.
Buffalo Cement Co., Buffalo, N. Y.
Leslie Jay Bennett, Buffalo, N. Y.
F. C. Diebold, Buffalo, N. Y.
Brownell Improvement Co., Chicago, Ill.
F. C. Murphy, Chicago, Ill.
Callanan Road and Improvement Co., Albany, N.Y.
J. R. Callanan, Albany, N. Y.
B. R. Babcock, Albany, N. Y.
Carbon Limestone Co., Youngstown, Ohio.
J. C. King, Youngstown, Ohio.
F. O. Earnshaw, Youngstown, Ohio.
Casparis Stone Co., Columbus, Ohio.
W. R. Casparis, Columbus, Ohio.
E. T. Walker, Columbus, Ohio.
Cerulean Stone Co., Cerulean, Ky.
A. M. Andrew, Cerulean, Ky.
J. L. Nicholson, Henderson, Ky.
N. P. Taylor, Cerulean, Ky.
Clark Rock and Gravel Co., Los Angeles, Calif.
J. V. L. Clark, Los Angeles, Calif.
Geo. R. Collins Granite Co., Danville, Va.
Geo. R. Collins, Danville, Va.
Commonwealth Quarry Co., Summit, N. J.
L. C. Bonnell, Summit, N. J.
Consumers Co., Chicago, Ill.
J. J. Sullivan, Chicago, Ill.
A. L. Moscrip, Chicago, Ill.
H. Royer, Chicago, Ill.
J. H. Schwab, Chicago, Ill.
Canada Crushed Stone Corporation, Ltd., Dundas, Ont., Canada.
C. M. Doolittle, Dundas, Ont., Canada.
Geo. H. McHaffie, Dundas, Ont., Canada.
W. H. Lindsey, Hamilton, Canada.
C. Cline, Dundas, Ont., Canada.
Columbia Quarry Co., St. Louis, Mo.
E. J. Krause, St. Louis, Mo.
C. P. Tigges, St. Louis, Mo.
G. C. Krause, St. Louis, Mo.
C. E. Klaus, Columbia, Ill.
R. W. Hunt, St. Louis, Mo.
B. G. Forman, Valmeyer, Ill.
Dolese and Shepard Co., Chicago, Ill.
O. P. Chamberlain, Chicago, Ill.
Davis Bros. Stone Co., Lanon, Wis.
G. J. Loos, Menomonee Falls, Wis.
Dolomite Co., Rochester, N. Y.
John H. Odenbach, Rochester, N. Y.
John T. Dyer Quarry Co., Philadelphia, Penn.
F. T. Gucker, Norristown, Penn.
France Stone Co., Toledo, Ohio.
H. E. Bair, Toledo, Ohio.
H. M. Sharp, Toledo, Ohio.
Leo Poorman, Toledo, Ohio.
M. R. Ward, Toledo, Ohio.
D. W. Yambert, Toledo, Ohio.
Geo. B. Carber, Toledo, Ohio.

G. G. Black, Toledo, Ohio.
A. E. Crumm, Toledo, Ohio.
J. J. Harrigan, Toledo, Ohio.
E. E. Mann, Toledo, Ohio.
W. F. Janowski, Toledo, Ohio.
G. L. Hartz, Toledo, Ohio.
R. L. Callaghan, Cleveland, Ohio.
W. A. Stelzer, Urbana, Ohio.
C. D. Ward, Richmond, Ind.
Eagle Point Lime Works, Dubuque, Iowa.
P. M. Nauman, Dubuque, Iowa.
Elmhurst Chicago Stone Co., Elmhurst, Ill.
M. M. Bales, Elmhurst, Ill.
R. Hammerschmidt, Elmhurst, Ill.
Geo. F. Hammerschmidt, Elmhurst, Ill.
General Crushed Stone Co., Easton, Pa.
John Rice, Easton, Pa.
Otho M. Graves, Easton, Pa.
Frank S. Jones, Easton, Pa.
H. B. Allen, Philadelphia, Pa.
T. A. Lanagan, Winchester, Mass.
John Rice, Jr., Easton, Pa.
Geo. E. Schaefer, Rochester, N. Y.
Gopher Stone Co., Minneapolis, Minn.
P. A. Schroeder, Minneapolis, Minn.
Gordon Crushed Stone Co., Toronto, Ont., Canada.
R. D. Gordon, Toronto, Ont., Canada.
Greenville Stone and Gravel Co., Memphis, Tenn.
H. C. Martin, Williford, Ark.
L. T. McCourt, Memphis, Tenn.
Edward Hely Stone Co., Cape Girardeau, Mo.
Norman L. Hely, Cape Girardeau, Mo.
Hagersville Quarry, Ltd., Hagersville, Ont., Can.
F. B. Marble, Hagersville, Ont., Canada.
W. E. Rowe, St. Thomas, Ont., Canada.
Holston Quarries Co., Knoxville, Tenn.
R. S. Campbell, Knoxville, Tenn.
C. O. Hunsicker, Allentown, Penn.
Charles J. Kline, Allentown, Penn.
Interstate Crushed Stone Co., Springfield, N. J.
M. M. Bamberger, Springfield, N. J.
Kelley Island Lime and Transport Co., Cleveland, Ohio.
E. M. Lamkin, Cleveland, Ohio.
A. B. Mack, Cleveland, Ohio.
Kentucky River Stone and Sand Co., Lawrenceburg, Ky.
T. B. Ripy, Lawrenceburg, Ky.
Keystone Trap Rock Co., Glenmoore, Penn.
John S. Galt, Glenmoore, Penn.
Lambertville Stone Quaryr Co., Philadelphia, Penn.
J. W. Ireland, Lambertville, N. J.
L. & M. Stone Co., Utica, N. Y.
Wm. McGrew, Utica, N. Y.
Lehigh Stone Co., Kankakee, Ill.
John Edgewood, Kankakee, Ill.
Leroy Lime and Crushed Stone Corp., Leroy, N. Y.
F. M. Howe, Leroy, N. Y.
Lutz Stone Co., Oshkosh, Wis.
R. W. Lutz, Oshkosh, Wis.
Marble Cliff Quarries Co., Columbus, Ohio.
Russell Rarey, Columbus, Ohio.
W. H. Margraf, Columbus, Ohio.
Ralph Morden, Columbus, Ohio.
E. C. Powers, Columbus, Ohio.
Morris County Crushed Stone Co., Morristown, N. J.
F. W. Schmidt, Jr., Morristown, N. J.
I. W. Wortman, Morristown, N. J.
Mayville White Lime Works, Mayville, Wis.
C. G. Ruedebush, Mayville, Wis.
Carl H. Ruedebush, Mayville, Wis.
Monon Crushed Stone Co., Monon, Ind.
Geo. H. Balfe, LaFayette, Ind.
New Haven Trap Rock Co., New Haven, Conn.
W. Scott Eames, New Haven, Conn.
North Jersey Quarries Co., Morriestown, N. J.
F. W. Schmidt, Morristown, N. J.
National Crushed Stone Association, Columbus, Ohio.
A. P. Sandles, Secretary, Columbus, Ohio.
Claude L. Clark, Assistant Secretary, Columbus, Ohio.
National Lime and Stone Co., Carey, Ohio.
H. R. Williams, Carey, Ohio.
N. H. Ryder, Carey, Ohio.
W. B. Payne, Carey, Ohio.
R. G. Spencer, Carey, Ohio.
National Quarries Co., Lima, Ohio.
Frank X. Clifford, Lima, Ohio.
Elmer Hilty, Lima, Ohio.
Newcastle Lime and Stone Co., Newcastle, Penn.
W. W. Duff, Newcastle, Penn.
Gilbert Ellwood, Newcastle, Penn.
Ohio and Indiana Stone Co., Greencastle, Ind.
Norman E. Kolb, Greencastle, Ind.
Ohio Marble Co., Piqua, Ohio.
Mrs. A. A. Hall, Piqua, Ohio.
A. Acton Hall, Jr., Piqua, Ohio.
H. H. Brandon, Piqua, Ohio.
W. E. Stone, Piqua, Ohio.
H. A. Johnston, Piqua, Ohio.
C. H. Suessman, Piqua, Ohio.
J. W. Keyt, Piqua, Ohio.
Old Colony Crushed Stone Co., Quincy, Mass.
Eugene A. Atwood, Quincy, Mass.
Edmund Putnam, Pittsfield, Mass.
Pembroke Lime Stone Corp., Pembroke, Va.
A. W. Lumsden, Pembroke, Va.
Pounding Mill Quarry Corp., Pounding Mill, Va.
C. M. Hunter, Pounding Mill, Va.
Reinhold & Co., Inc., Pittsburgh, Penn.
P. B. Reinhold, Pittsburgh, Pa.
Rock Cut Stone Co., Syracuse, N. Y.
W. L. Sporberg, Syracuse, N. Y.
A. G. Seitz, Syracuse, N. Y.
H. R. Cox, Syracuse, N. Y.
E. C. Owens, Auburn, N. Y.
J. A. Murphy, Auburn, N. Y.
Stringtown Crushed Rock Co., McAlester, Okla.
H. C. Perry, McAlester, Okla.
The Supply Distributors Corporation, Cleveland, Ohio.
H. Schmidt, Cleveland, Ohio.
Templeton Limestone Co., Kittanning, Penn.
Harry R. Gault, President, Kittanning, Penn.
Texas Stone Products Co., Dallas, Texas.
Col. E. C. Dodson, Dallas, Texas.
Thomas & Frankenburg, Canon City, Colo.
J. P. Thomas, Jr., Canon City, Colo.
The Trap Rock Co., Minneapolis, Minn.
Harry E. Wunder, Minneapolis, Minn.
The R. B. Tyler Co., Louisville, Ky.
R. B. Tyler, Louisville, Ky.
Universal Granite Quarries Co., Chicago, Ill.
W. A. Armstrong, Chicago, Ill.
V. I. Sloan, Chicago, Ill.
Chas. Wincell, Lohrville, Wis.
The Van Camp Stone Co., Cincinnati, Ohio.
B. T. Van Camp, Cincinnati, Ohio.
Otto C. Muth, Cincinnati, Ohio.
F. C. Cunning, Cincinnati, Ohio.
H. D. Van Camp, Cincinnati, Ohio.
R. B. Hoobler, Cincinnati, Ohio.
E. J. Newmeyer, Ithonia, Ga.
W. B. Warner, Newport, Ky.
The Wagner Quarries Co., Sandusky, Ohio.
W. J. Sprow, Sandusky, Ohio.
Wallace Stone Co., Bay Port, Mich.
W. H. Wallace, Jr., Bay Port, Mich.
Whitehouse Stone Co., Toledo, Ohio.
E. E. Evans, Toledo, Ohio.
Wisconsin Granite Co., Chicago, Ill.
J. J. Sloan, Chicago, Ill.
F. A. Sloan, Chicago, Ill.
J. A. McGuire, Chicago, Ill.
H. J. Gallagher, Sioux Falls, S. D.
John Monoghan, Alexandria Bay, N. Y.
Geo. Mason, Dell Rapids, S. D.
C. W. Ackerman, Berlin, Wis.
Wm. Gall, Ableman, Wis.
Wm. Wiske, Red Granite, Wis.
Wood County Stone and Construction Co., Bowling Green, Ohio.
W. W. Browning, Bowling Green, Ohio.
Waterstreet Trap Rock Co., Waterstreet, Penn.
I. G. Owens, Waterstreet, Penn.
Western Lime and Cement Co., Milwaukee, Wis.
R. W. Scherer, Milwaukee, Wis.
Wickwire Spencer Steel Corp., Buffalo, N. Y.
W. E. Foote, Buffalo, N. Y.
L. R. Smith, Buffalo, N. Y.

## ASSOCIATE MEMBERS

Allis-Chalmers Mfg. Co., Chicago, Ill.
J. M. Johnson, Chicago, Ill.
B. McGrew, Chicago, Ill.
J. S. Bond, Milwaukee, Wis.
American Hoist and Derrick Co., St. Paul, Minn.
W. M. Schoen, Indianapolis, Ind.
American Manganese Steel Co., Chicago, Ill.
B. C. Carr, Chicago, Ill.
J. O. F. Clark, St. Louis, Mo.
W. G. Broughton, Chicago Heights, Ill.
Armstrong Manufacturing Co., Waterloo, Iowa.
Geo. G. Armstrong, Waterloo, Iowa.
G. E. Armstrong, Waterloo, Iowa.
G. R. Watson, Waterloo, Iowa.
F. J. Schomer, Waterloo, Iowa.
O. M. Cavin, Waterloo, Iowa.
E. A. McElroy, Waterloo, Iowa.
Atlas Powder Co., Wilmington, Del.
A. A. Mellin, Pittsburgh, Pa.
Howard Sergent, Pittsburgh, Pa.
C. E. Clifford, Pittsburgh, Pa.
Austin Manufacturing Co., Chicago, Ill.
O. E. Thaleg, Chicago, Ill.
Earle C. Bacon, Inc., New York City.
Wm. Young, New York City.
The Browning Co., Cleveland, Ohio.
R. G. Miller, Jr., Cleveland, Ohio.
L. B. Janes, Cleveland, Ohio.
J. C. Houston, New York, N. Y.
Bucyrus Co., Chicago, Ill.
Mark J. Woodhull, Chicago, Ill.
E. G. Lewis, Chicago, Ill.
E. E. Pollock, Milwaukee, Wis.
C. G. Buchanan Co., New York, N. Y.
G. W. Flounders, New York, N. Y.
The Carroll Chain Co., Columbus, Ohio.
Walter Carroll, Columbus, Ohio.
The Columbus McKinnon Chain Co., Columbus, Ohio.
O. H. Hager, Columbus, Ohio.
Cement Mill and Quarry, Chicago, Ill.
E. S. Hanson, Chicago, Ill.
E. I. du Pont de Nemours and Co., Wilmington, Del.
S. R. Russell, Wilmington, Del.
R. H. Summer, St. Louis, Mo.
H. H. Hamilton, Pittsburgh, Pa.
J. C. Ahl, Lima, Ohio.
J. E. Orr, Lexington, Ky.
P. N. Dennison, Pittsburgh, Penn.
Easton Car and Construction Co., Easton, Penn.
W. E. Farrell, Easton, Penn.
G. D. Fraunfelder, Easton, Penn.
Ensign Bickford Co., Simsbury, Conn.
J. K. Brandon, Simsbury, Conn.
Erie Steam Shovel Co., Erie, Penn.
H. A. Titus, Erie, Penn.
Fairbanks-Morse Co., Cincinnati, Ohio.
C. W. House, Chicago, Ill.
H. V. Hodge, Cincinnati, Ohio.
Fate-Root-Heath Co., Plymouth, Ohio.
H. R. Sykes, Plymouth, Ohio.
G. C. Stein, Plymouth, Ohio.
Flexible Steel Lacing Co., Chicago, Ill.
Wm. J. Young, Birmingham, Ala.
James S. Fitzgerald, Columbus, Ohio.
Frog, Switch and Manufacturing Co., Pittsburgh, Penn.
J. S. Morrison, Pittsburgh, Penn.
H. A. Johann, Chicago, Ill.
J. G. Johann, Chicago, Ill.
General Electric Co., Schenectady, N. Y.
L. W. Shugg, Schenectady, N. Y.
E. W. Pilgrim, Schenectady, N. Y.
Fred A. Gill, Lebanon, Penn.
Graham Coal Co., Philadelphia, Penn.
R. B. Graham, Philadelphia, Penn.
Grasselli Powder Co., Cleveland, Ohio.
N. N. Herd, Cleveland, Ohio.
M. S. Kincaid, Cleveland, Ohio.
J. J. Hefferman, Cleveland, Ohio.
Roy Banfield, Cleveland, Ohio.
Hadfield-Penfield Steel Co., Bucyrus, Ohio.
S. F. Virtue, Bucyrus, Ohio.
N. Whitcraft, Bucyrus, Ohio.
Arthur Whitcraft, Bucyrus, Ohio.
The Harnischfeger Corp., Milwaukee, Wis.
M. B. Bradley, Milwaukee, Wis.
R. P. Thomas, Milwaukee, Wis.
The Hayward Co., New York City.
H. M. Davidson, New York City.
Hendrick Manufacturing Co., Carbondale, Penn.
B. G. Shotton, Pittsburgh, Penn.
B. G. Dann, New York, N. Y.
Hercules Powder Co., Wilmington, Del.
N. S. Greensfelder, Wilmington, Del.
S. A. Johnson, New York, N. Y.
J. Barab, Wilmington, Del.
J. I. Horty, New York, N. Y.
W. J. Austin, Chicago, Ill.
Wm. A. Anderson, Buffalo, N. Y.
W. F. Gainty, Chicago, Ill.
R. J. Brodhead, Chicago, Ill.
W. B. Lyon, Pittsburgh, Penn.
C. C. Gerow, Wilmington, Del.
I. Keane, Columbus, Ohio.
The Hill Clutch Machine and Foundry Co., Cleveland, Ohio.
E. A. Smith, Cleveland, Ohio.
Inland Engineering Co., Chicago, Ill.
E. S. Black, Chicago, Ill.
Kenneth Jensen, Chicago, Ill.
Jeffrey Manufacturing Co., Columbus, Ohio.
F. G. Fowler, Columbus, Ohio.
G. D. Francisco, Columbus, Ohio.
Keystone Consolidated Publishing Co., Pittsburgh, Penn.
E. B. Day, New York, N. Y.
R. C. Becker, Pittsburgh, Penn.
Keystone Lubricating Co., Philadelphia, Penn.
F. D. Street, Philadelphia, Penn.
K. K. Buzby, Philadelphia, Penn.
H. A. Buzby, Philadelphia, Penn.
J. H. Yerkes, St. Louis, Mo.
G. W. Hall, Cincinnati, Ohio.
Philip King, Cincinnati, Ohio.
Oliver Bennett, Philadelphia, Penn.
Peter Cassady, Philadelphia, Penn.
Kennedy Van Saun Manufacturing and Engineering Corp., New York, N. Y.
Wm. Jennings, Pittsburgh, Penn.
C. B. Scott, New York, N. Y.
Koehring Co., Milwaukee, Wis.
Vernon Clarke, Milwaukee, Wis.
The Loomis Machine Co., Tiffin, Ohio.
J. Renyard, Tiffin, Ohio.
B. L. Lott, Tiffin, Ohio.
C. A. Riggs, Tiffin, Ohio.
Charles C. Hale, Tiffin, Ohio.
Manganese Steel Forge Co., Philadelphia, Penn.
L. W. Jones, Philadelphia, Penn.
H. A. Johann, Chicago, Ill.
Marion Steam Shovel Co., Marion, Ohio.
H. T. Gracely, Marion, Ohio.
F. B. Tetzel, Marion, Ohio.
C. L. Cheney, Rochester, N. Y.
E. R. Wilson, Marion, Ohio.
Homer Littlefield, Marion, Ohio.
J. C. French, Marion, Ohio.
Midwest Locomotive Works, Cincinnati, Ohio.
W. C. Armstrong, Cincinnati, Ohio.
J. L. Smith, Cincinnati, Ohio.
The Morgan Engineering Co., Alliance, Ohio.
A. T. Davis, Alliance, Ohio.
R. R. Glover, Cincinnati, Ohio.
Osgood Co., Marion, Ohio.
Earl C. Smith, Marion, Ohio.
H. W. Davant, Marion, Ohio.
Chester Phillips, Chicago, Ill.
Frank D. Manning.
Pennsylvania Crusher Co., Philadelphia, Penn.
C. S. Darling, Chicago, Ill.
Pit and Quarry, Chicago, Ill.
H. W. Munday, Chicago, Ill.
Y. M. Weiss, Chicago, Ill.
W. A. Wilson, Chicago, Ill.
Quaker City Rubber Co., Wissinoming, Philadelphia, Penn.
W Trunnel, Cincinnati, Ohio.
Rock Products, Chicago, Ill.
N. C. Rockwood, Chicago, Ill.
Edmund Shaw, Chicago, Ill.
F. A. Alter, Chicago, Ill.

Geo. M. Earnshaw, Cleveland, Ohio.
Robins Conveying Belt Co., New York, N. Y.
Thos. Robins, Jr., New York, N. Y.
W. H. Norrington, New York, N. Y.
M. S. Lambert, Chicago, Ill.
E. R. Morgan, Pittsburgh, Penn.
Sanderson-Cyclone Drill Co., Orrville, Ohio.
H. H. Sanderson, Orrville, Ohio.
M. B. Garber, Orrville, Ohio.
K. O. Crum, Orrville, Ohio.
J. N. Rose, Orrville, Ohio.
W. S. Ford, Orrville, Ohio.
Smith Engineering Works, Milwaukee, Wis.
D. D. Barnes, New York City, N. Y.
S. A. MacIntosh, Milwaukee, Wis.
Victor H. Jones, Chicago, Ill.
Symons Brothers Co., Milwaukee, Wis.
J. M. Thistlethwaite, Milwaukee, Wis.
L. D. Hudson, New York, N. Y.
Oscar Gruender, Milwaukee, Wis.
Taylor-Wharton Iron and Steel Co., High Bridge, N. J.
C. B. Andrews, High Bridge, N. J.
C. T. Ramsey, St. Louis, Mo.
Thew Shovel Co., Lorain, Ohio.
B. E. Onkst, Chicago, Ill.
S. R. Horner, Lorain, Ohio.
R. H. Wilson, Lorain, Ohio.
Traylor Engineering and Manufacturing Co., Allentown, Penn.
B. Haislip, Chicago, Ill.
Trojan Powder Manufacturing Co., Allentown, Penn.
V. H. Dent, Allentown, Penn.
E. A. Rupp, Allentown, Penn.
H. B. Srodes, Allentown, Penn.
The W. S. Tyler Co., Cleveland, Ohio.
J. H. Jackson, Chicago, Ill.
A. E. Reed, Cleveland, Ohio.
H. F. Pierson, Cleveland, Ohio.
Williams Crusher and Pulverizer Co., St. Louis, Mo.
A. E. Schneider, Chicago, Ill.
Geo. D. Whitcomb Co., Rochelle, Ill.
S. S. Swasey, Rochelle, Ill.
C. W. Chappelle, Rochelle, Ill.
The Orrville Simpson Co., Cincinnati, Ohio.
John Schott, Cincinnati, Ohio.
Hugh Garvin, Cincinnati, Ohio.
Orville Simpson, Cincinnati, Ohio.
Lowe Simpson, Cincinnati, Ohio.

GUESTS

F. C. Alsdorf, Centerville, Ohio.
J. F. Benton, Kent Mill Co., Brooklyn, N. Y.
O. A. Brand, Cleveland, Ohio.
C. J. Brister, New York Central Lines, Chicago, Ill.
L. A. Boulay, Federal Stone Co., Chicago, Ill.
A. W. Catlin, Allentown, Penn.
H. V. Clarke, Cincinnati, Ohio.
C. N. Conner, State Highway Commission, Raleigh, N. C.
M. Y. Cooper, Union Trust Bldg., Cincinnati, Ohio.
Bruce Dodson, Casualty Reciprocal Ex., Kansas City, Mo.
C. P. Donner, Egypt, Penn.
Mrs. F. O. Earnshaw, Youngstown, Ohio.
Mrs. W. Scott Eames, New Haven, Conn.
Russell G. East, Penn. Railroad Sys., Shelbyville, Ind.
M. A. Eiben, Northern Blower Co., Cleveland, O.
H. P. Eells, Cleveland, Ohio.
Geo. A. Ennis, Byers Machine Co., Ravenna, O.
Carl D. Franks, Chicago, Ill.
C. V. R. Fullenwider, Philip-Carey Co., Cincinnati, O.
Mrs. H. J. Gallagher, Sioux Falls, S. D.
Allen W. Gehman, Allentown, Penn.
A. T. Goldbeck, Washington, D. C.
R. E. Greely, Greely Stone Co., St. Paul, Ind.
P. Hubbard, New York, N. Y.
O. C. Hovey, Detroit, Mich.
Chas. L. Harrison, Cincinnati, Ohio.
A. R. Hirst, American Vibrolithic Co., Madison, Wis.
Mrs. S. R. Horner, Lorain, Ohio.
H. F. Janda, Highway Research Board, Washington, D. C.
Mrs. H. F. Johnson, Piqua, O.
A. F. Keenan, Chicago, Ill.
J. Keeth, Lewis & Copeland Co., East Liberty, Ohio.
T. W. Kelly, Indianapolis, Ind.
T. W. Kelly, Durable Roads Co., Indianapolis, Ind.
Herbert Klinker, Barrett Company, Cleveland, O.
E. C. Lewis, Lewis & Copeland Co., Lima, O.
I. F. Lewis, The Poplar Ballast Co., Carter, Ky.
R. G. Lewis, State House, Columbus, O.
W. W. Magill, Cincinnati Rubber Mfg. Co., Cincinnati, O.
George E. Martin, Chicago, Ill.
Gilbert Meister, Cleveland, Ohio.
W. J. Michael, Ohio Locomotive Crane Co., Bucyrus, O.
Mrs. John C. Monaghan, Alexandria Bay, N. Y.
Allan J. Moynihan, Chicago, Ill.
J. H. Mobley, Olive Hill Limestone Co., Olive Hill, Ky.
Chas. McIntire, Standard Slag Co., Columbus, O.
Chas. McAllister, Supply Distributors Corp., Cleveland, O.
W. E. McNasser, Syracuse, N. Y.
J. B. McTamamy, Louisville, Ky.
J. F. Otto, West Windfield, Pa.
G. W. Patnoe, Cairo, O.
Mrs. Allen Patterson, Findlay, Ohio.
W. B. Pabter, High Bridge, Ky.
W. W. Patnoe, Tiffin, Ohio.
H. S. Perry, State Highway Dept., Columbus, O.
H. O. Pierce, Syracuse, N. Y.
W. J. Piggott, Webster Stone Co., Irvington, Ky.
Mrs. Edmund Putnam, Pittsfield, Mass.
F. T. Ruane, Ruane Machine Co., Pittsburgh, Penn.
Ed. Vero, Ruane Machine Co., Pittsburgh, Pa.
Mrs. W. L. Sporborg, Syracuse, N. Y.
J. A. Slipher, Columbus, Ohio.
A. J. Schafmeyer, Board of Local Improvements, Chicago, Ill.
Herman Schmidt, Supply Distributors, Cleveland, O.
F. D. Schnerl, Cincinnati Rubber Mfg. Co., Cincinnati, O.
Tyrrell B. Shertzer, Columbus, Ohio.
R. M. Smith, Toronto, Ont., Canada.
S. E. Stephenson, Wellston Iron Furnace Co., Jackson, O.
S. A. Swint, Swint Stone Co., Fremont, O.
E. B. Taylor, Mid-West Crushed Stone Co., Greencastle, Ind.
W. H. Tarvin, Kentucky Rock Asphalt Co., Louisville, Ky.
J. R. Thoenen, Greenville, Ohio.
Mrs. J. P. Thomas, Jr., Canon City, Colo.
R. C. Towles, Washington, D. C.
Mrs. B. T. Van Camp, Cincinnati, Ohio.
J. R. Werner, Marion, Ill.
R. L. Wilkinson, Cincinnati Rubber Mfg. Co., Cincinnati, O.

## Gordon Willis on 1925 Outlook

UNDER the caption, "Captains of Industry Predict Greatest Year of Prosperity with No End of It in Sight," the St. Louis, Mo., *Globe-Democrat* of Sunday, January 4, 1925, quotes Gordon Willis, president of the Hunkins-Willis Lime and Cement Co., as follows:

"As records will show, building construction work was much below normal during the past eight or ten years, but during 1923 and 1924 there was a very marked increase. Even with this satisfactory condition, the shortage of buildings, both industrial and residential, was not overcome.

"Capital was reluctant to invest in building construction, due to the opinion that prices of materials and labor were too high to justify new building projects. This condition has been allayed and it is now very generally agreed that existing prices will not be reduced, and it is reasonable to expect an advance. We feel that this condition alone will warrant investments in building projects that have been held back for the past few years. It is our strong opinion that 1925 will show more activity in the building line than any year in the past. Our reasons are as follows: Because of the confidence that big business has in the national administration; because of the increased prices of farm products, thus giving the farmer tremendous buying power; increased earnings of railroads, due to greater tonnage and favorable rates, resulting in large purchases of new equipment and making repairs in all departments that have been suspended for some years, thereby creating a large increased demand for iron and steel products, as well as other materials. A large portion of industrial plants in all lines have shown such results in 1924 as to justify increased production. This means that industrials will have to seek larger quarters and increased facilities. The abundance of money available for all forms of business activities at very favorable rates of interest. It is our opinion that conditions in Europe will be greatly improved, thereby reacting on the commerce of the United States. Our exports to Europe and other foreign countries of grain, steel and many other commodities will, we believe, be largely increased. While there is a probability of an advance in the cost of building materials, as well as labor, yet we believe that such increase will be a reasonable one and not such as to prevent building activities. As industrials prosper, so do the employes, and the latter, owing to steady employment and increased denumeration, will build homes for themselves, thus increasing building activity for dwellings and flats.

"In conclusion, will state, in the strongest terms, that 1925 will be one of the most satisfactory and successful years in our line of business."

## Cement and Rock Companies Do Not Want to Be Included in City Limits

THE city commissioners of Cape Girardeau, Mo., passed a resolution to include the Marquette Cement Company and the Holy Rock Crusher in the annexation plan and set January 17 for citizens to vote on the expansion program. The new boundaries proposed would take in approximately 5,000 persons and vastly increase the area, taking in dozens of manufacturing plants and farms at the east. The only outspoken objection to the program has been against taking in the Marquette and the Hely plants, which are not located in a residential district, the two companies having expressed a desire to remain outside, according to local papers.

## "Concrete for Permanence"

BURIED in concrete for 14 years, a watch was found recently in Los Angeles, Calif., still ready to tick away the time.

William Garlock found the time piece while tearing down an old building. He wound it up and it keeps good time.

The watch, the finder learned, was dropped by a cement worker when the building was in course of construction.

## Florida Sand Company Enlarging

THE St. Petersburg, Fla., Sand Co. has purchased trackage on the Seaboard Railway in St. Petersburg, on which it will erect a warehouse and build a yard, from which it will deliver the sand it gets from its deposits on the Alafia river, across Tampa bay, according to the *St. Petersburg Times*.

## Illinois Sand and Gravel Men Meet

THE Illinois Gravel and Sand association of Illinois, held a meeting at Galesburg, December 24, and matters of concern to the organization were discussed. Nine or ten delegates attended from outside the city. The Galesburg representative was Maynard Swanson, who is interested in the Galesburg Sand and Gravel Co., which operates a sand and gravel pit near Buda. These sessions are held every two or three months.

The local company is at present producing eight to ten car loads of gravel and sand daily.

Due to the fact that the state board commission admits of the use of sand and gravel in the construction of state roads, the demand for the product the coming year is likely to increase, and in this the meeting was interested. But all the product, it was stated, is subjected to rigid tests, and inferior products are excluded.

The Galesburg company supplied the gravel and sand used in the building of the hard road from here to Alton, and also for some other minor state jobs. It expects to figure in other work of a similar character the coming year.

Sand and gravel also were used in the building of the hard road from here to Monmouth.

Other large dealers here in sand are Terry and Lewis, but Mr. Lewis is in California, and Mr. Terry was not able to be present. H. H. Guenther is also preparing to expand along the sand and gravel line.—*Galesburg (Ill.) Republican.*

## Cherokee Rock Asphalt Company to Begin Production

A NEW payroll, with approximately 300 men on it, will be added to the assets of the Muscle Shoals district about February 1st to 15th, when the Cherokee Rock Asphalt Co., will swing into action at both its quarry and plant at Cherokee, Ala.

The company has its quarry ready for business now, and has two steam shovels and one steam drill at work at present. The quarry is connected with the rock crushing plant at Cherokee by a railroad, built by the cement company, and has a locomotive and a number of cars in commission for hauling the stone from the quarry to the crushing plant.

The thing which is holding back immediate operation is the inability of the Alabama Power Co. to get through the transmission line from its Gorgas line to Cherokee. They are promising however that they will complete it by February 1st and the crushing plant will be ready to go into action by the time the line is finished. —*Florence (Ala.) News.*

## Associated General Contractors Oppose Extension of Lien to Material Men

THE following resolution, adopted at the annual convention of the Associated General Contractors held in Washington, D. C., the week of January 12, bears directly on the interests of rock products producers:

WHEREAS, the original intent of the lien law was for the protection of the laborer and mechanic; and

WHEREAS, the material and supply firms use the lien law as a basis for establishing credit; and

WHEREAS, the unsuspecting owners commonly find themselves compelled by law to pay twice for material; and

WHEREAS, the construction industry is materially and detrimentally affected by the irresponsible being furnished material under the protection of the lien law;

THEREFORE, BE IT RESOLVED, that this association go on record as opposed to the enactment of any lien law which may be used as an extension of credit to the purchaser of materials.

BE IT FURTHER RESOLVED, that the Associated General Contractors, through its various publications and otherwise, oppose the practice of sales being made under the protection of lien laws in such states as the lien law now exists.

## Studies in Lime

STUDIES IN LIME is a beautiful publication which will find a place in many an architectural library, as it deserves to. The pages are 9x11 in., which gives the handsome views of interiors a chance to be appreciated. Several illustrations are in color. Of course the most valuable part of the work to the craftsman is that which contains the specifications and directions for making the various finishes and the large scale drawings of cornices and other plastering detail, but the general reader will be greatly interested in the excellent little history of lime with which the book is introduced. It is issued by the Kelley Island Lime and Transport Co., Leader-News building, Cleveland, Ohio, and it is worthy even of the world's "largest producer of lime."

## Municipal Ownership

THE municipal asphalt plant of Kansas City represents an investment of approximately $100,000. It was recently appraised at $50,000. The plant has been idle since April 21.

Operated under the Cromwell administration. it cost the city $23 a ton to treat the asphalt used for street repairs. The present board has been purchasing better asphalt at $10 a ton, it is alleged.

With those facts before it, the board realized it would be much more economical to purchase its asphalt from private contractors than to operate the asphalt plant, it was said.—*Kansas City (Mo.) Times.*

## Making Limestone Sand in Missouri

THE manufacture of limestone chats and sand is a practically new industry here (in Springfield, Mo.), and the four crushing plants located in and about Springfield have a combined daily output of approximately 400 tons a day.

Until a few years ago the value of limestone sand for building material was not determined until samples of the sand were sent to numerous chemists of the country, who, after analyzing the product, reported that results of the tests were much greater than the best river sand ever used. Since that time limestone sand produced in Springfield has been used extensively in local building materials.

It is also being used more extensively in local building operations since tests have been made, it was said. In the construction of the huge reservoir at the Fulbright pumping station, a property of the Springfield City Water Co., 3500 tons of limestone sand was used. Springfield limestone sand was also used exclusively in the recent construction of the elevators of the Lipscomb Grain Co., and hundreds of tons were used in the construction of the new buildings at State Teachers College here.

Three plants to manufacture the limestone sand and chats are already in operation here, and the fourth, the Stigall Construction Co., will begin the operation of a large crushing plant north of the city within the next few weeks. Local plants are operated by Harry Horton, south of the city; the Eight Mile Road district, and the Quarry Products Co., north of the city.—*Springfield (Mo.) Republican.*

## "Quicksand" Mine in Topeka, Kansas

FRANK SNYDER, superintendent of the street department of Topeka, Kans., has been forced to close down his quicksand mines. The cold weather is responsible.

Commissioner Snyder's mines are at the west end of the Sardou bridge. The quicksand, which is about the same size as cornmeal grains, is largely in demand for use in making asphalt. The sand was deposited in this locality in large strips during the in this locality during the 1903 flood.

In mining the sand, it is necessary to go through a strip of dirt from 3 to 4 ft. in depth before the sand vein is found. Then a vein is followed along until it is exhausted. Sometimes, Snyder says, a vein will run for many feet and be 3 to 4 ft. in thickness. At other times a vein will diminish rapidly and prove a failure before any great amount of sand has been secured.

During the last few days 2000 loads of sand have been hauled to the city asphalt plant, but frosted fingers on Thursday night on the men working with the metal containers in which the sand is loaded led them to ask a layoff today. As a result, the mines are idle.—*Topeka (Kans.) Journal.*

# Hints and Helps for Superintendents

## Stone Crusher Drive Gives Satisfaction

By C. C. HERMANN
Consulting Engineer, Waterloo, Iowa

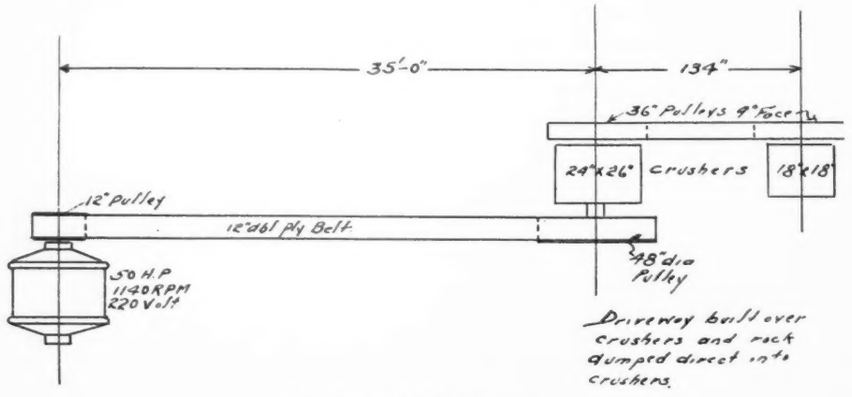
I KNOW of no place where a belt is called upon to give efficient service under so many adverse conditions as that in connection with stone crushing. The power requirements are usually heavy and intermittent. The machinery in nine installations out of every ten is out in the weather which means that the belt must run in the open for some part of its length. The quarry is generally low, increasing the dampness and resulting in the belt's operating under moisture conditions that are not conducive to long life. The stone dust usually covers the belt, giving it a coating of material that draws the belt lubrication out and causes the belt to slip and eventually crack. These are just a few of the conditions under which the belt must give service.

I was called out on a crusher job some little while ago to assist in the solution of a driving problem. Perhaps the conditions I discovered in this connection and the methods employed to overcome them will serve to aid some others in the solution of a difficult drive.

The illustration shows the crusher and drive lay-out as I found it. The equipment consisted in two crushers placed on 134 in. centers as shown. Each crusher was equipped with 36-in. pulleys, and the forward crusher was also equipped with a 48-in. flywheel, 13-in. face, and a rim section of 4 in. The two crushers were belted together with a short belt running on the 36-in. pulleys, and the main drive consisted in a 12-in. belt heavy double ply leather. The motor, a 50 h.p. 1140 r.p.m. 220-volt, 3-phase, 60-cycle induction type was located 35 ft. centers with the forward crusher. The forward crusher was larger than the other. The jaw size of the larger crusher was 24 in. x 26 in. with a capacity for 20 tons per hour, and the other had jaws 18 in. x 18 in.

The trouble was slippage of the main drive belt. With a revolution counter I found that the motor was running up to full load speed and that the crusher was running at 246 r.p.m. The motor pulley was 12 in. in diameter, which should give the crusher a speed of 285 r.p.m.; however, its actual speed under operation was 246 r.p.m., or the slippage amounted to 14% nearly.

In order to determine the load on the crushers I had ammeter readings taken.




***Crusher and drive lay-out***

The maximum load was 115 amperes, which, multiplied by the voltage and divided by the horsepower equivalent, or 746, gave 33.9 horsepower. The belt speed in feet per minute taking the crusher speed at 246 r.p.m. was 3091 ft. or 51.5 ft. per second. Since the belt is one ft. wide we have 51.5 sq. ft. of belt in contact per second. The belt should therefore transmit well over 36 horsepower; however, it is possible that at times the horsepower requirements would exceed that found as the maximum at the time. At any rate the margin was considered rather narrow for such drive.

In this installation everything was out in the open. A house was built over the motor, the trucking platform over the crusher being the only protection at this point. The rock was being hauled out of the pit in dump-board wagons and there was considerable moisture dripping through the cracks of the driveway onto the machinery and belt. The belt was protected for part of its length by a wooden cover that was inadequate to keep the moisture from it. The operator had attempted to eliminate the slippage by tightening up on the motor base, but each time this was attempted there would be trouble through heated bearings. It was apparent that the belt speed should be increased or else a wider belt purchased. The crusher pulley would permit a belt one in. wider, but that would add only 3 h.p. at the most, bringing it up to about 39 h.p.

The difficulty would be overcome by increasing the belt speed to around 4500 ft. per minute. Taking the normal speed as the basis and figuring backward, that is, dividing 4500 by 285 and then dividing this by 3.1416, we found that the pulley must be 60 in. in diameter. The best thing that could be obtained was a 58-in. pulley which gave a belt speed of 4323 ft. per minute. Further checking after this was done showed a reduction of belt slippage to 3%.

This matter of belt slippage is one that applies not only to quarries, but wherever belt drives are used. It will bear further study by all who are in any measure responsible for the power transmission. The solution of many problems of belting is similar and when the matter is understood, applied, and the results noted in one instance, other applications readily present themselves. Of course, there are many reasons why large pulleys are avoided wherever possible. In the mill large pulleys are objectionable because of their initial cost; however, if the management would consider that the saving often made by purchasing a smaller pulley will be spent many times in belt slippage, the general avoidance of the large pulley would be eliminated. Many manufacturers today are turning to silent chain drives as the solution to the matter of belt slippage. Chain drives have their desirable characteristics and are adaptable in many cases; but can industry in general afford to discard the complete power transmission equipment in use at present? That is a matter for each to decide individually. If the only reason for such conversion is to avoid belt slippage, then progress may be taken cautiously in an advantageous manner.

Belt transmission at high speed is often objected to on the basis of dust, hazards and the extra precautions that must be taken in the matter of guarding. The objection is more or less imaginary. If there are accumulations of dust on a belt from standing idle, and this is the only way that dust is really scattered by a belt, then it would be apparent with any speed when the machine is started. A heavy belt should be amply guarded under any

conditions, not entirely as a matter of safety to the employes but as a protection to the belt as well. Should a belt break it may be badly damaged by coming in contact with moving parts of machines or slapping around as it comes off the pulley.

Very little progress can be made against belt slippage by increasing the tension of the belt. The greater the tension on the belt, the harder the work will be on the structure of the belt. We find here the great advantage of leather belt drives—the flexibility in driving. With any other positive drive such as gears and chain the shock of starting is transmitted direct to the machine or motor, whereas with the belt drive there is the slight give in the leather that makes starting gradual—no sudden shocks—and if something is caught in the machine we have the slippage to fall back on without breaking an expensive machine. This is an insurance against huge repair bills that is not present in the case of a positive drive. The initial tension on the belt must be well within the limits of the belt so that when pulling its load the tension will not exceed its ultimate strength, damage the fibers, and thereby shorten the life.

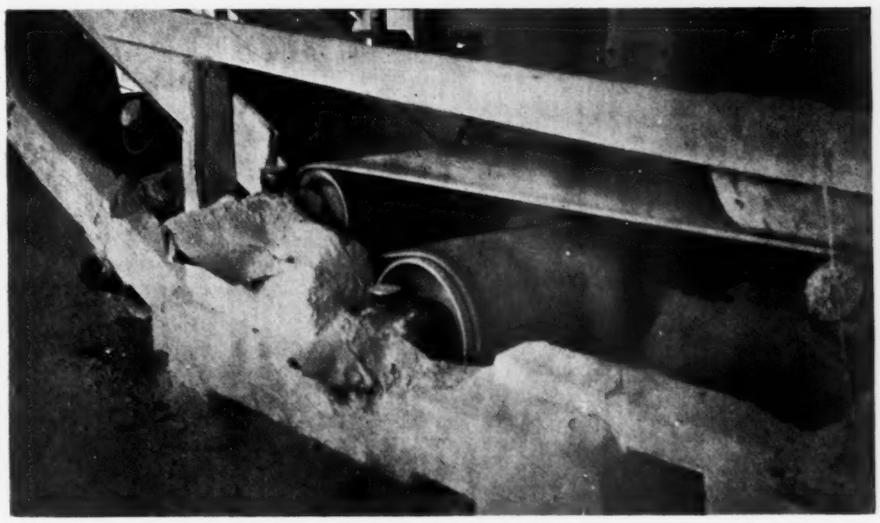
The condition of the belt surface often leads to a cure of belt slippage without the necessity of increasing its speed in feet per minute. Belt dressing in the hand of every Tom, Dick and Hary about the shop will soon place the belts in such surface condition that they will not pull anywhere near their capacity. If belts were serviced at stated intervals as they should be under competent management, much of the belt grief would be eliminated, the life of the belt would be materially increased, and the investment necessary to maintain the belt drives materially reduced.

Ample protection from the weather, moisture, overhead drips, and foreign matter will show up in reduced belt maintenance. Every problem is not so difficult as the crusher drive, but there are principles of service and management set forth there that may be applied with profit to the drives in many mills and factories.

## Changing a Belt Conveyor from Horizontal to Incline

IT is not usual to run the same belt of a conveyor on the horizontal stretch and the inclined stretch, unless the angle is so flat and the stretches long enough so that the belt can be run as a curve, changing from the horizontal to the incline with about 300 ft. radius. Where conditions will not allow this long radius curve it is the practice to use two belts, one feeding the other.

This takes two drives, including gearing and motors. The cut shows how one belt was made to do the work of the two and the expense of two drives avoided. The horizontal belt passes to a pulley back of the pulley at hte end of the horizontal stretch and then goes up the incline. The material carried on the horizontal stretch thus falls on the inclined stretch just as though there were two conveyors. The drive and head pulley for te combination are at hte top of the incline.



***One way of changing the angle of a belt conveyor, but one not recommended by belting experts***

This method saves in first cost, but it is hard on the belt. Rock Products asked the opinion of one or two conveyor engineers and they condemned it. They said that the face of the belt should not be run on a pulley, as it was not intended for such service and would probably crack after a short time of use. Of course, the face of the pulley runs on the return idlers, but they explained that this did not injure the belt, as the belt was not under tension, and there was only a small contact area where the belt touched the idler.

## Use for Old Steam Shovel Dipper Teeth

THE accompanying view shows a use for old steam shovel teeth, which is not entirely new to these columns, but so good that we are taking the liberty of showing it again. The picture shows an old dipper tooth fastened to the floor of a chute to divide and break the flow of crushed stone or gravel.

***Steam-shovel dipper tooth used to save impact on crusher head***

## How to Test a Chain

IF the chain has been overloaded, it has been stretched. If it is measured carefully at frequent intervals, any elongation that is not the result of wear is a sure proof of overload. In that case it is to be presumed that the chain is too light for its present service and should be replaced. If the chain is amply strong for its regular use it is still possible for careless handling to cause a serious momentary overload. From the condition of operation it is easy to determine whether chain or workman should be corrected.

The question of price is usually a question of the proper factor of safety. Whether a certain job requires ¾ in. or 1 in. chain is a question for an engineer. That is, the number of pounds of chain is properly a matter for technical opinion, but all too often the quality, if it affects the price per pound, is in the hands of a non-technical purchasing department. It would seem logical to include both under the same category and both subject to engineering judgment.

The law and the prophets can easily be summed up in two sentences. First, buy good chain. Second, don't overload it.

The answer to the first requirement is to buy chain honestly and conscientiously, chain made of good material; and the answer to the second, constant and careful inspection.—*A. V. De Forrest in Safety Engineering.*

Rock Products will welcome the experience of plant superintendents with such devices as that illustrated in the adjoining column. Does your experience justify the condemnation of the belting experts of this kind of a conveyor hook-up? Let's have some of your experience!

# Output of Portland Cement in 1924

## Geological Survey Estimates of December Production

THE following tables, prepared under the direction of Ernest F. Burchard, of the Geological Survey, are based mainly on the reports of producers of portland cement. The December, 1924, totals include estimates for two plants. December production shows an increase and shipments a decrease as compared with 1923; stocks are the greatest at the end of any year recorded by the survey; the preliminary totals for 1924 show increase of 8.3 and 7.2% respectively for production and shipments over the final totals for 1923, thus making new high records.

Stocks of clinker, or unground cement, at the mills at the end of December, 1924 amounted to about 5,401,000 bbl. compared with 4,025,000 bbl. (revised) at the beginning of the month.

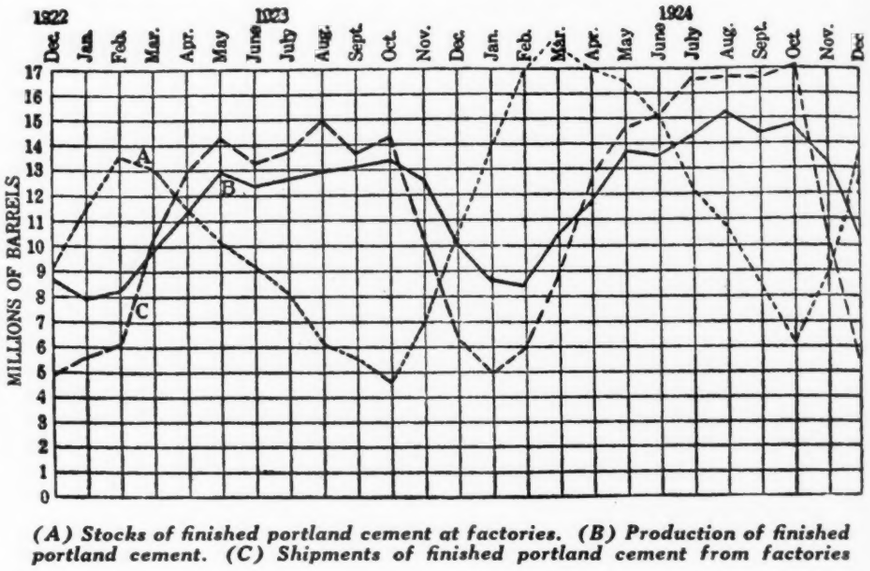
The Bureau of Foreign and Domestic Commerce, of the Department of Commerce, reports that the imports of hydraulic cement in November, 1924, amounted to 198,806 bbl., valued at $305,598. The total imports in 1923 amounted to 1,678,636 bbl., valued at $2,964,098.

The imports in November were from Belgium, 87,187 bbl.; Norway, 77,268 bbl.; Denmark, 26,022 bbl.; Canada, 3,265 bbl.; England, 2,091 bbl.; other countries, 2,973 bbl.

The imports were received in the following districts: Los Angeles, 77,989 bbl.; Philadelphia, 32,629 bbl.; Porto Rico, 26,022 bbl.; San Francisco, 23,442 bbl.; Florida, 11,915 bbl.; New Orleans, 9,746 bbl.; Massachusetts, 4,599 bbl.; New York, 4,504 bbl.; South Carolina, 3,104 bbl.; Rhode Island, 2,532 bbl.; other districts, 2,324 bbl.

The exports of hydraulic cement in November, 1924, were 42,490 bbl., valued at $130,519, of which there was sent to Cuba, 17,743 bbl.; to the other West Indies, 1,696 bbl.; Mexico, 10,227 bbl.; South America, 7,553 bbl.; Central America, 2,596 bbl.; Canada, 660 bbl.; and to other countries, 2,015 bbl. These exports are exclusive of shipments to the following possessions: Porto Rico, 5,824 bbl.; Hawaii, 1,539 bbl.; Alaska, 324 bbl.

The statistics of imports and exports of hydraulic cement in December, 1924, are not available.


1922
1923
1924
Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
MILLIONS OF BARRELS
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
A
B
C

***(A) Stocks of finished portland cement at factories. (B) Production of finished portland cement. (C) Shipments of finished portland cement from factories***

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN DECEMBER, 1923 AND 1924, AND STOCKS IN NOVEMBER, 1924, IN BARRELS

| Commercial district | Production—December, 1923 | Production—December, 1924 | Shipments—December, 1923 | Shipments—December, 1924 | Stocks at end of December, 1923 | Stocks at end of December, 1924 | Stocks at end of November, 1924* |
|---|---|---|---|---|---|---|---|
| E'n Penn., N. J., & Md. | 2,553,000 | 2,883,000 | 1,951,000 | 1,606,000 | 1,883,000 | 2,488,000 | 1,211,000 |
| New York | 557,000 | 565,000 | 402,000 | 283,000 | 653,000 | 793,000 | 511,000 |
| Ohio, W'n Penn. & W. Va. | 930,000 | 898,000 | 463,000 | 346,000 | 1,061,000 | 1,370,000 | 817,000 |
| Michigan | 536,000 | 491,000 | 295,000 | 182,000 | 784,000 | 937,000 | 629,000 |
| Wis.,† Ill., Ind. & Ky. | 1,444,000 | 1,519,000 | 687,000 | 527,000 | 1,571,000 | 2,040,000 | 1,048,000 |
| Va., Tenn., Ala. & Ga. | 708,000 | 947,000 | 550,000 | 792,000 | 458,000 | 469,000 | 314,000 |
| E'n Mo., Iowa, Minn. & S. D.‡ | 1,018,000 | 953,000 | 374,000 | 263,000 | 1,929,000 | 2,723,000 | 2,034,000 |
| W'n Mo., Neb., Kan. & Okla. | 734,000 | 705,000 | 411,000 | 315,000 | 1,163,000 | 1,469,000 | 1,078,000 |
| Texas | 227,000 | 372,000 | 187,000 | 258,000 | 278,000 | 356,000 | 242,000 |
| Colo. & Utah | 133,000 | 138,000 | 90,000 | 63,000 | 290,000 | 316,000 | 241,000 |
| Calif. | 965,000 | 879,000 | 889,000 | 774,000 | 412,000 | 469,000 | 364,000 |
| Ore., Wash. & Mont. | 192,000 | 85,000 | 109,000 | 97,000 | 418,000 | 427,000 | 439,000 |
| | 9,997,000 | 10,435,000 | 6,408,000 | 5,506,000 | 10,900,000 | 13,857,000 | 8,928,000 |

*Revised. †Began producing and shipping June, 1924. ‡Began producing December, 1924.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1923 AND 1924, IN BARRELS

| Month | Production 1923 | Production 1924 | Shipments 1923 | Shipments 1924 | Stocks at end of month 1923 | Stocks at end of month 1924 |
|---|---|---|---|---|---|---|
| January | 7,990,000 | 8,788,000 | 5,628,000 | 5,210,000 | 11,477,000 | 14,155,000 |
| February | 8,210,000 | 8,588,000 | 6,090,000 | 5,933,000 | 13,596,000 | 16,815,000 |
| March | 9,880,000 | 10,370,000 | 10,326,000 | 8,995,000 | 13,045,000 | 18,189,000 |
| First quarter | 26,080,000 | 27,746,000 | 22,044,000 | 20,138,000 | | |
| April | 11,359,000 | 11,726,000 | 12,954,000 | 12,771,000 | 11,463,000 | 17,159,000 |
| May | 12,910,000 | 13,777,000 | 14,257,000 | 14,551,000 | 10,144,000 | 16,403,000 |
| June | 12,382,000 | 13,538,000 | 13,307,000 | 15,036,000 | 9,168,000 | 14,903,000 |
| Second quarter | 36,651,000 | 39,041,000 | 40,518,000 | 42,358,000 | | |
| July | 12,620,000 | 14,029,000 | 13,712,000 | 16,614,000 | 8,081,000 | 12,319,000 |
| August | 12,967,000 | 15,128,000 | 14,971,000 | 16,855,000 | 6,080,000 | 10,666,000 |
| September | 13,109,000 | 14,519,000 | 13,698,000 | 16,827,000 | 5,533,000 | 8,404,000 |
| Third quarter | 38,696,000 | 43,676,000 | 42,381,000 | 50,296,000 | | |
| October | 13,350,000 | 14,820,000 | 14,285,000 | *17,160,000 | 4,612,000 | 6,073,000 |
| November | 12,603,000 | 13,141,000 | 10,251,000 | 10,289,000 | 6,991,000 | *8,928,000 |
| December | 9,997,000 | 10,435,000 | 6,408,000 | 5,506,000 | 10,900,000 | 13,857,000 |
| Fourth quarter | 35,950,000 | 38,396,000 | 30,944,000 | 32,955,000 | | |
| Preliminary total | 137,377,000 | 148,859,000 | 135,887,000 | 145,747,000 | | |
| Amount of under estimate | 83,000 | | 25,000 | | | |
| Final total | 137,460,000 | | 135,912,000 | | | |

*Revised.

IMPORTS AND EXPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1923 AND 1924, IN BARRELS*

| | 1923 | 1924 | 1923 | 1924 |
|---|---|---|---|---|
| January | 71,686 | 153,732 | 74,169 | 88,586 |
| February | 20,529 | 162,930 | 88,531 | 62,606 |
| March | 66,521 | 160,517 | 98,861 | 91,224 |
| April | 76,899 | 148,138 | 85,662 | 83,200 |
| May | 88,480 | 161,304 | 103,634 | 88,850 |
| June | 111,559 | 196,655 | 77,203 | 74,064 |
| July | 286,106 | 109,098 | 82,774 | 60,139 |
| August | 324,008 | 192,634 | 73,201 | 85,883 |
| September | 215,785 | 134,245 | 77,121 | 69,470 |
| October | 172,051 | 211,228 | 74,302 | 79,180 |
| November | 140,590 | 198,806 | 85,743 | 42,490 |
| December | 104,422 | * | 80,487 | † |
| | 1,678,636 | | 1,001,688 | |

*Compiled from records of the Bureau of Foreign and Domestic Commerce.
†Imports and exports in December, 1924, not available.

SUMMARY OF ESTIMATES OF STOCKS OF PORTLAND CEMENT AT END OF EACH MONTH IN 1924, BY DISTRICTS.
(In thousands of barrels.)

Stocks of finished cement.

| Commercial District | Jan.* | Feb.* | Mar.* | Apr.* | May* | June* | July* | Aug.* | Sept.* | Oct.* | Nov.* | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern Penn., N. J. & Md. | 2,830 | 4,067 | 4,729 | 4,392 | 4,165 | 3,521 | 2,734 | 2,092 | 1,373 | 677 | 1,211 | 2,488 |
| New York | 923 | 1,070 | 1,258 | 1,301 | 1,238 | 1,028 | 784 | 645 | 553 | 379 | 511 | 793 |
| Ohio, Western Pa. & W. Va. | 1,481 | 1,735 | 1,936 | 1,918 | 1,883 | 1,639 | 1,193 | 1,018 | 895 | 472 | 817 | 1,370 |
| Michigan | 814 | 881 | 952 | 888 | 765 | 571 | 528 | 521 | 338 | 282 | 629 | 937 |
| Wis., †Ill., Ind. & Ky. | 2,257 | 2,779 | 2,954 | 2,701 | 2,524 | 2,356 | 1,950 | 1,554 | 857 | 436 | 1,048 | 2,040 |
| Va., Tenn., Ala. & Ga. | 631 | 751 | 797 | 755 | 771 | 753 | 606 | 414 | 360 | 290 | 314 | 469 |
| Eastern Mo., Ia., Minn. & S. Dak.‡ | 2,518 | 2,868 | 2,788 | 2,519 | 2,491 | 2,410 | 2,110 | 2,046 | 1,747 | 1,502 | 2,034 | 2,723 |
| Western Mo., Neb., Kan. & Okla. | 1,260 | 1,227 | 1,265 | 1,124 | 1,096 | 1,195 | 1,137 | 1,142 | 1,109 | 872 | 1,078 | 1,469 |
| Texas | 305 | 400 | 396 | 337 | 308 | 298 | 264 | 245 | 207 | 215 | 242 | 356 |
| Colo. & Utah | 261 | 230 | 211 | 196 | 183 | 188 | 167 | 191 | 184 | 181 | 241 | 316 |
| California | 373 | 300 | 370 | 418 | 382 | 365 | 326 | 334 | 338 | 364 | 364 | 469 |
| Ore., Wash. & Mont. | 502 | 507 | 533 | 610 | 597 | 579 | 520 | 464 | 443 | 403 | 439 | 427 |
| | 14,155 | 16,815 | 18,189 | 17,159 | 16,403 | 14,903 | 12,319 | 10,666 | 8,404 | 6,073 | 8,928 | 13,857 |

*Revised. †Began producing and shipping June, 1924. ‡Began producing December, 1924.

Stocks of clinker, or unground cement.

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| United States | 5,458 | 6,905 | 8,271 | 8,545 | 8,225 | 7,609 | 6,646 | 5,367 | 4,260 | 3,548 | 4,025 | 5,401 |

SUMMARY OF ESTIMATES OF PRODUCTION AND SHIPMENTS OF FINISHED PORTLAND CEMENT IN 1924, BY DISTRICTS.
(In thousands of barrels.)

Production.

| Commercial District. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | 1924 | 1923 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern Penn., N. J. & Md. | 2,382 | 2,600 | 3,087 | 3,024 | 3,463 | 3,301 | 3,418 | 3,621 | 3,528 | 3,598 | 3,376 | 2,883 | 38,281 | 35,722 |
| New York | 459 | 276 | 460 | 656 | 685 | 696 | 718 | 803 | 765 | 809 | 655 | 565 | 7,547 | 6,990 |
| Ohio, Western Penn. & W. Va. | 779 | 708 | 863 | 981 | 1,201 | 1,282 | 1,503 | 1,707 | 1,628 | 1,495 | 1,277 | 898 | 14,322 | 13,496 |
| Michigan | 299 | 314 | 510 | 615 | 877 | 899 | 1,058 | 1,105 | 986 | 1,080 | 928 | 491 | 9,162 | 7,620 |
| Wis., †Ill., Ind. & Ky. | 1,346 | 1,276 | 138 | 1,723 | 1,960 | 2,044 | 2,166 | 2,133 | 2,128 | 2,229 | 1,894 | 1,519 | 21,856 | 21,193 |
| Va., Tenn., Ala. & Ga. | 696 | 753 | 837 | 886 | 985 | 939 | 962 | 1,049 | 1,083 | 1,115 | 1,095 | 947 | 11,347 | 7,909 |
| Eastern Mo., Ia., Minn. & S. Dak.‡ | 960 | 921 | 872 | 982 | 1,481 | 1,444 | 1,333 | 1,596 | 1,478 | 1,518 | 1,313 | 953 | 14,851 | 14,037 |
| Western Mo., Neb., Kan. & Okla. | 394 | 403 | 618 | 895 | 1,053 | 939 | 935 | 1,033 | 1,009 | 985 | 943 | 705 | 9,912 | 9,779 |
| Texas | 314 | 363 | 346 | 404 | 412 | 390 | 409 | 414 | 343 | 415 | 384 | 372 | 4,566 | 4,179 |
| Colo. & Utah | 61 | 85 | 104 | 204 | 267 | 279 | 273 | 283 | 262 | 275 | 194 | 138 | 2,425 | 2,428 |
| California | 922 | 745 | 978 | 1,017 | 1,069 | 992 | 986 | 1,063 | 1,015 | 1,062 | 887 | 879 | 11,615 | 11,002 |
| Ore., Wash. & Mont. | 176 | 144 | 257 | 339 | 324 | 333 | 268 | 321 | 294 | 239 | 195 | 85 | 2,975 | 3,105 |
| | 8,788 | 8,588 | 10,370 | 11,726 | 13,777 | 13,538 | 14,029 | 15,128 | 14,519 | 14,820 | 13,141 | 10,435 | 148,859 | 137,460 |

Shipments.

| Commercial District. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct.* | Nov. | Dec. | 1924 | 1923 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern Penn., N. J. & Md. | 1,384 | 1,361 | 2,425 | 3,361 | 3,690 | 3,945 | 4,205 | 4,263 | 4,247 | 4,298 | 2,845 | 1,606 | 37,630 | 36,134 |
| New York | 189 | 129 | 272 | 613 | 747 | 906 | 962 | 942 | 901 | 983 | 523 | 283 | 7,450 | 6,853 |
| Ohio, Western Penn. & W. Va. | 360 | 461 | 661 | 999 | 1,237 | 1,526 | 1,955 | 1,882 | 1,752 | 1,919 | 932 | 346 | 14,030 | 13,211 |
| Michigan | 196 | 247 | 429 | 679 | 1,010 | 1,093 | 1,100 | 1,175 | 1,169 | 1,132 | 581 | 182 | 8,993 | 7,466 |
| Wis., †Ill., Ind. & Ky. | 635 | 752 | 1,264 | 1,973 | 2,133 | 2,209 | 2,570 | 2,529 | 2,825 | 2,660 | 1,278 | 527 | 21,355 | 21,057 |
| Va., Tenn., Ala. & Ga. | 523 | 633 | 799 | 933 | 996 | 956 | 1,109 | 1,241 | 1,138 | 1,185 | 1,070 | 792 | 11,375 | 7,621 |
| Eastern Mo., Ia., Minn & S. Dak.‡ | 296 | 572 | 952 | 1,251 | 1,509 | 1,524 | 1,633 | 1,660 | 1,777 | 1,763 | 782 | 263 | 13,982 | 13,624 |
| Western Mo., Neb., Kan. & Okla. | 278 | 436 | 580 | 1,036 | 1,081 | 840 | 993 | 1,036 | 1,043 | 1,220 | 737 | 315 | 9,595 | 9,573 |
| Texas | 287 | 268 | 351 | 463 | 440 | 401 | 442 | 433 | 380 | 407 | 358 | 258 | 4,488 | 4,091 |
| Colo. & Utah | 70 | 117 | 122 | 219 | 279 | 275 | 293 | 259 | 269 | 278 | 134 | 63 | 2,378 | 2,341 |
| California | 898 | 818 | 908 | 970 | 1,106 | 1,010 | 1,025 | 1,056 | 1,011 | 1,036 | 890 | 774 | 11,502 | 10,883 |
| Ore., Wash. & Mont. | 94 | 139 | 232 | 274 | 323 | 351 | 327 | 379 | 315 | 279 | 159 | 97 | 2,969 | 3,058 |
| | 5,210 | 5,933 | 8,995 | 12,771 | 14,551 | 15,036 | 16,614 | 16,855 | 16,827 | 17,160 | 10,289 | 5,506 | 145,747 | 135,912 |

*Revised. †Began producing and shipping June, 1924. ‡Began producing December, 1924.

## DISTRIBUTION OF CEMENT

The following figures show shipments from Portland cement mills distributed among the States to which cement was shipped for the period from August to October, 1924. It is planned to publish in succeeding issues of this report similar figures for succeeding months and also for the preceding months back to October, 1923, when these figures are available.

Portland Cement Shipped from Mills into States, by Months, August-October, 1924*.

| Shipped to— | Barrels August | September | October |
|---|---|---|---|
| Alabama | 185,494 | 167,959 | 197,661 |
| Alaska | 1,053 | 1,846 | 437 |
| Arizona | 32,615 | 39,176 | 44,385 |
| Arkansas | 139,515 | 114,134 | 119,926 |
| California | 960,221 | 936,834 | 983,747 |
| Colorado | 174,924 | 150,865 | 164,675 |
| Connecticut | 179,012 | 193,380 | 182,135 |
| Delaware | 49,501 | 52,272 | 47,713 |
| District of Columbia | 80,080 | 79,399 | 78,597 |
| Florida | 198,827 | 220,021 | 184,982 |
| Georgia | 134,819 | 151,930 | 137,133 |
| Hawaii | 1,842 | 2,076 | 2,736 |
| Idaho | 28,042 | 30,221 | 29,721 |
| Illinois | 1,404,542 | 1,584,579 | 1,586,058 |
| Indiana | 781,376 | 764,188 | 653,557 |
| Iowa | 357,329 | 461,405 | 401,177 |
| Kansas | 228,297 | 228,064 | 288,005 |
| Kentucky | 203,792 | 222,361 | 253,180 |
| Louisiana | 104,683 | 116,770 | 112,263 |
| Maine | 48,807 | 41,945 | 42,897 |
| Maryland | 256,498 | 230,946 | 243,639 |
| Massachusetts | 369,062 | 364,320 | 385,297 |
| Michigan | 1,252,561 | 1,263,113 | 1,217,809 |
| Minnesota | 392,542 | 397,268 | 335,139 |
| Mississippi | 60,512 | 59,499 | 59,230 |
| Missouri | 435,736 | 501,596 | 593,899 |
| Montana | 26,332 | 24,935 | 19,682 |
| Nebraska | 178,020 | 204,610 | 226,786 |
| Nevada | 9,847 | 12,815 | 10,010 |
| New Hampshire | 46,592 | 37,872 | 42,073 |
| New Jersey | 712,602 | 756,579 | 774,400 |
| New Mexico | 24,153 | 29,306 | 13,848 |
| New York | 1,966,885 | 1,953,647 | 1,971,186 |
| North Carolina | 383,174 | 295,252 | 326,870 |
| North Dakota | 33,148 | 24,990 | 15,796 |
| Ohio | 1,164,939 | 1,059,982 | 1,255,408 |
| Oklahoma | 193,464 | 185,550 | 207,750 |
| Oregon | 153,691 | 141,492 | 112,073 |
| Pennsylvania | 1,737,633 | 1,672,054 | 1,813,998 |
| Porto Rico | 0 | 0 | 1,000 |
| Rhode Island | 63,326 | 70,196 | 80,138 |
| South Carolina | 50,890 | 52,416 | 42,076 |
| South Dakota | 53,360 | 60,159 | 67,413 |
| Tennessee | 176,909 | 196,000 | 187,410 |
| Texas | 379,845 | 308,305 | 357,878 |
| Utah | 41,539 | 47,993 | 39,420 |
| Vermont | 46,512 | 36,842 | 30,376 |
| Virginia | 189,686 | 184,713 | 178,013 |
| Washington | 208,254 | 175,169 | 154,515 |
| West Virginia | 207,811 | 191,320 | 187,214 |
| Wisconsin | 551,562 | 603,204 | 556,838 |
| Wyoming | 46,597 | 38,828 | 32,900 |
| Unspecified | 73,614 | 37,101 | 45,338 |
| | 16,782,067 | 16,777,497 | 17,096,407 |
| Foreign Countries | 72,933 | 49,503 | 63,593 |
| Total shipped from cement plants | 16,855,000 | 16,827,000 | 17,160,000 |

*Includes estimated distribution of shipments from four plants in August and September; from three plants in October.

## A Catalog of Special Sands

THE business of making special sands has apparently been more developed in Great Britain than in the United States. A very good catalog of such sands has been issued by Algernon Lewis Curtis, Westmoor Laboratory, Chatteris, Eng., which is called "Curtis Tested Sands for All Industrial Purposes." Mr. Curtis is well known in England as an expert.

It is noted in this catalog that there are 77 different kinds of sands used in various industries. Some of these, such as finely divided carborundum and asbestos, we do not classify with sands in this country. The other sands of which special note is made are: Abrasive sands, sands for agricultural testing, for aluminum casting, asphalt paving, bedding cattle cars, grinding and bevelling, bird sand, sands for bottle glass, for molding brass and bronze, for brick making, and mortar making, sand for cement testing (the same as Standard Ottawa); filtration sands and the various molding and refractory sands used in the steel industry. A sand not often supplied by producers in this country is that used in starting cuttings and for greenhouse use, "free from putrescible matter and micro-organisms that might affect the plants." Placing sands for use in potteries is another uncommon kind.

Interest in and the production of special sands is increasing in this country, and this year will probably see several plants erected for making them. But there is probably no firm in this country which handles so large a variety of special sands.

## Official Statement on Cement Securities Company Dissolution

PRESIDENT CHAS. BOETTCHER, of the Cement Securities Co., Denver, Colo., has issued the following statement to stockholders in his company:

"The Cement Securities Co. heretofore has carried on its operations through the ownership or control of the capital stock of several subsidiary corporations, which in turn have owned and operated the cement plants, the Cement Securities Co. being organized exclusively as a holding company, and not for the purpose of directly owning or operating such plants.

"Some months ago the officers and directors of the Cement Securities Co. reached the conclusion that it was advisable to eliminate the holding company and the various subsidiary companies, through which it has heretofore carried on its operations, and to organize an operating company which would own direct title to the cement plants, now controlled through stock ownership. The suit instituted by the United States Government under the Sherman act in January, 1922, has, however, prevented the consummation of these plans up to this time.

"This suit was brought to a hearing on December 13, 1924, as a result of which a final decree has been entered directing the Cement Securities Co. to dispose of the plant of the United States Portland Cement Co. at Concrete, Colo., and one of the plants of the Three Forks Portland Cement Co. at Trident and Hanover, Mont., within two years; except that in the event of change in conditions this time may be extended or the terms of the decree modified by the court. The decree also contains the customary injunctions against agreements with other cement manufacturers covering what are commonly known as trade practices.

"The Cement Securities Co. or its successor will retain its interest in the cement plants at Portland, Colo.; Devil's Slide, Utah; Superior, Neb.; Ada, Okla.; and whichever one of the two Montana plants is not sold, and will continue its operation of the plant to be sold pending their actual sale.

"In pursuance of the policy mentioned above, the Ideal Cement Co. has been organized under the laws of Colorado to take over all of the assets of the Cement Securities Co.

"The name 'Ideal' was adopted for the new company as this is the principal brand of cement manufactured by the subsidiary companies of the Cement Securities Co. at the present time.

"The Ideal Cement Co. has an authorized capital stock consisting of 125,000 shares of 7% cumulative, preferred stock of the par value of $100 per share and 250,000 shares of common stock without par value.

"Under the contract above mentioned there is being issued to the Cement Securities Co. of record on December 22, one share of preferred stock and two shares of common stock of the Ideal Cement Co. for each share of stock of the Cement Securities Co. now outstanding and the remainder of the authorized capital stock of the Ideal Cement Co. will be retained and used for its future corporate purposes. The result will be as follows:

| | Preferred | Common |
|---|---|---|
| Shares authorized | 125,000 | 250,000 |
| Issue to cement securities | 97,103 | 194,206 |
| Reserved in treasury | 27,891 | 55,794 |

"The certificates for stock in the Ideal Cement Co. will be mailed to stockholders as soon after December 22 as the same can be issued by the transfer agent.

"The board of directors of the Ideal Cement Co. has also declared an initial dividend of $1.75 per share on its preferred stock and 75 cents per share on its common stock, payable January 2, 1925, to stockholders of record at the close of business December 22, 1924.

"In the event any stockholder desires to preserve the identity of different lots of Cement Securities company stock purchased at different times and prices (in order to compute income tax liability on future sales of Ideal Cement Co. stock taking place at different times) he may return the original stock certificates of the Ideal Cement Co. issued to him and the Denver National Bank, transfer agent, will split up and reissue the same in such denominations as may be desired in order to retain such identity.

"It is the opinion of the board of directors of the Cement Securities Co. and the Ideal Cement Co. that this reorganiaztion will result in more economical operation.

"The Ideal Cement Co. will continue under the same policies and management as the Cement Securities Co. and will expand its business and construct new plants whenever and wherever business conditions and the requirements of any particular locality warrant such course of action.

"In this connection it has already been determined to construct in northern Colorado a cement plant thoroughly modern in every particular, the plans for which are now in course of preparation, and construction work will be started early in 1925."

## Illinois Gravel Firm to Build New Loading Plant

OZEE AND HAYES have the blue prints of a new gravel handling plant that they are contemplating building in the near future. It will consist of 14 units of bins, each of which will hold three carloads of gravel or sand. The bins are filled from the top, and are reached by elevated track. The material is shipped in dump cars which are run up over the bins and dumped directly into them.

Each bin is equipped at the bottom with a gate, and is built high enough for a wagon or truck to drive under. To load the truck all that is necessary is to open the gate.—*Mattoon (Ill.) Bulletin.*

## New Cement Company Established in Chattanooga, Tennessee

GENERAL offices for the Southland Portland Cement Co. have been opened on the second floor of the Volunteer building, Chattanooga, Tenn., having been selected as headquarters for the new $1,500,000 cement company.

James O. Parker announced that the company has purchased 9000 acres of land in Cumberland county, touched for a distance of about five miles by the Tennessee Central railroad. The station of Crab Orchard lies just about in the center of the recently-acquired property.

Plans of the company call for erection of a three-kiln cement plant which, when completed, will represent an investment of approximately $1,500,000. The plant will have a capacity of 3000 bbl. of cement a day. Mr. Parker stated that the site for the plant has been laid out and drawings of plans made.

Weather permitting, the company plans to start actual work on its plant in January or February. The plan is to erect one unit at the present time and to add the other two as soon as it is in operation. He predicted that the second and third units would be completed about eight months after the first is in operation.

Mr. Parker stated that the financing and organization of the company is not yet complete. Ben L. Ireland has been selected as the temporary secretary. Mr. Ireland is well known here. He is a Nashville real estate man. The president announced that L. H. Wright of Indianapolis is temporary vice-president and Oscar Mather of the Volunteer Life Insurance Co. is treasurer.

The president intimated that a larger part of the financing will come from Nashville. At the present time the stock has been only partially sold.

The land purchased contains deposits of coal, shale and limestone, the three principal elements in the manufacture of cement.

With the opening of offices here by the Southland company, Chattanooga has become the headquarters for three cement companies.—*Chattanooga (Tenn.) News.*

## National Cement Company's New Plant to Be Enlarged

THE reconstruction of the National Cement Co.'s plant at Ragland, Ala., is being done with the end in view of greatly increasing the output and will involve a greater sum than first contemplated.

The plant was burned some months ago and since that time the company has been rebuilding and at the same time providing for its customers by operating under adverse conditions.

The new plant will be of fireproof construction.—*Birmingham (Ala.) Age-Herald.*

# Editorial Comment

ROCK PRODUCTS got at least two new ideas from the eighth annual convention of the National Crushed Stone Association, which seem to have an important bearing on the future of the concrete aggregate branch of the crushed stone industry. The first of these has to do with the production of concrete aggregate. As was brought out in the paper of A. J. Schrafmeyer, city engineer of Chicago, future aggregate specifications may call simply for a certain fineness modulus, as 6.4, without regard to the various sizes from which the mixture is made. Long ago Prof. Abrams proved that aggregates of the same fineness modulus would give the same strength in concrete, whatever the mixture of sizes from which the modulus was determined.

**Developing the Crushed Stone Industry**

If this becomes the general practice, concrete aggregate will then be made as a corrected crusher run. The rock will be broken to pass through a screen of the largest limiting size and the product corrected to meet the requirements of the fineness modulus by adding natural sand or by finer crushing of a certain part of the product. The process will be both simpler and cheaper. The product will meet a definite specification requirement, and the engineer who uses the aggregate will be certain of the strength of his concrete, provided he conforms to the rules of mixing concrete in other respects. The method is thoroughly practical and it is already in use in Los Angeles where it was introduced by Paul E. Kressley, consulting engineer.

The second idea came from listening to a paper by Russell Rarey, of the Marble Cliffs Quarries Co., on limestone sands. In spite of all the effort that has been made to convince highway engineers and other authorities that screenings (in the form in which they are discharged from the plant) make an acceptable fine aggregate, not much success has been made. Mr. Rarey's company has taken its screenings, scalped off the excess of coarser sizes, and washed out the excess of fine sizes, leaving a product which passes every specification for fine aggregate, as issued by the State Highway Department, and which the highway engineers are not only willing but eager to accept. The coarse oversize and the fine undersize are saleable products, the first as "road chips" and the second as agstone.

Development in any industry depends upon turning all the raw material into products, which are not only saleable (because mere by-products are often sold at a loss), but products which are so badly wanted that users will pay a price for each and all of them that will leave a profit after the cost of production has been taken out. What is written above gives two ways by which this principle may be applied in the crushed stone industry.

Chairman Graves of the railroad committee of the National Crushed Stone Association, and now president of the association, in making his report before the convention, made the clearest exposition of the position of the Interstate Commerce Commission and the Kelly tariff rate that the writer has heard. Crushed stone producers, as well as sand and gravel producers, object to the cancellation of the Kelly tariff rule. But the Interstate Commerce Commission is anxious to have it cancelled because it is an endless source of trouble and litigation between the railroads. At the same time it does not intend to permit the railroads to issue joint rates except as these are based upon the rate under the Kelly rule.

**Kelly Tariff Rate Rule**

The trouble and litigation come from the fact that only those railroads which were taken over by the government during the war are bound by the Kelly rule. In the case where one road is so bound and the other is not, the road which is not bound insists on taking for its share of the joint rate its own single-haul rate from the junction point, which is the lion's share or more. To this the other carrier objects and brings suit. The Interstate Commerce Commission apparently does not care to (or perhaps it cannot) make the Kelly tariff common to all carriers. Since it is trying to effect its cancellation with some roads it cannot argue for its adoption by other roads. At the same time it will not permit the cancellation of the Kelly tariff to be used as an excuse for higher joint rates. So the matter stands at present and it is in an unsatisfactory situation. Unquestionably the shippers in the rock products industries, if they were to have the deciding of the matter, would say that they wanted the Kelly tariff rule retained and applied to all carriers.

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Speaking of the trade papers in the quarry industry, in his presidential address, John J. Sloan said at the National Crushed Stone Association convention:

**The Function of Trade Papers**

"With their descriptions of technical devices, potential market values and prices, they have enabled comparable standards to be established the country over that have been of great value and a direct guide to the policy of many a producer, so that our thanks are in a special manner due to our various trade papers and their staffs, who deserve from the industry all the appreciation that you can bestow upon them."

ROCK PRODUCTS of course is thankful to Mr. Sloan for his kind words, but it is even more thankful to him for having so clearly defined the function of a trade paper as the editors of this paper see it.

## J. L. Shiely Builds Two Plants to Ballast the Great Northern Railroad

J. L. SHIELY, treasurer of the National Sand and Gravel Association and one of the large producers of the country, with three plants at St. Paul, Minn., has built two large gravel plants for the Great Northern R. R. to produce ballast for their lines and expects to build others. Mr. Shiely will operate the plants and will use them to produce commercial sand and gravel as well as ballast.

The Great Northern operates 3,000 miles of road, enough if stretched out in one line to reach from the Atlantic to the Pacific. It is the intention of the company to ballast practically all of this with gravel and to do this it will build plants about 500 miles apart.

Two of these plants are already under construction, one at Chinook and one at Warland, Mont. They are Link Belt plants in design and construction, the same as those which Mr. Shiely has built in St. Paul.

These plants are owned by the railroad, both construction and operation being conducted by Mr. Shiely on a contract basis. He will lease them as required for the production of sand and gravel which he will sell for highway and other purposes.

This arrangement seems an excellent method for the railroads to secure the good gravel ballast which Chief Engineer Ford of the Rock Island told the members of the National Sand and Gravel Association he found it difficult to secure from producers. The Great Northern has secured the services of one of the most experienced producers in the country, which was the thing to do, as the attempts of railroads to produce their own ballast have not been particularly successful. The railroad has built the plants because it is probable that a strictly commercial producer would not find a sufficient market at some of the points where the railroad needs ballast plants. And finally it has created new business for itself and given the communities along the lines much needed supplies of highway and other building material by allowing the plants to be used for the production of such material.

## Death of J. H. Rodgers

J. HERMAN RODGERS, 50 years old, general manager and treasurer of the Rodgers Sand Co., and a director of the company, died January 9 in a sanitarium at Mercer, Penn., following an illness of two years.

Mr. Rodgers was born in Clarington, Ohio, and went to Pittsburgh at an early age to enter the employ of his father, Captain William B. Rodgers, who had a controlling interest in the Tide Coal Co., now owned by the Pittsburgh Coal Co. Shortly after that concern was bought by the Monongahela River Consolidated Coal and Coke Co. Mr. Rogers served as transportation manager of its steamboat department, but later resigned to assume the duties of manager and treasurer of the Rodgers Sand Co., when that concern was organized by his father. Later he became a director of the company.

## Boyne City Portland Cement Company Organization

OFFICIAL announcement has just been made of the organization of the Boyne City Portland Cement Co., with an authorized capitalization of $2,000,000. Directors of the company are: W. H. White, L. W. Siegel, W. L. Martin, Boyne City; W. J. Pearson, Boyne Falls; John Quill, Vanderbilt. Officers are: W. H. White, president; L. W. Siegel, secretary-treasurer; F. B. Gerrard, general manager and chief engineer; trust fund depository, National Bank of Commerce, Detroit. The securities commission, after a very thorough investigation, approved the project. The sale of stock is placed in the hands of a strong organization of Detroit which will sell $1,500,000 of stock at this time. The stock will be listed at $10 per share.

At the annual meeting of the stockholders of the new Boyne City Portland Cement Co., January 10, the following board of directors was elected for the ensuing year: W. H. White, F. B. Gerrard, W. L. Martin, John Parker, all of Boyne City; W. J. Pearson, Boyne Falls; John Quill, Vanderbilt. The stockholders approved an exhaustive report of the activities of the organization which was submitted by General Manager F. B. Gerrard, who also outlined plans for the future. Everything connected with the source of raw material is in a satisfactory condition. The sale of stock is reported to be progressing very satisfactorily. Board of directors elected officers as follows: President, W. H. White; vice president and general manager, F. B. Gerrard; secretary, L. W. Siegel; treasurer, W. L. Martin.—*Michigan Contractor and Builder.*

## New Texas Stone Plant to Be Opened

THE Buckeye Stone Co. will shortly open its rock crushing plant at Tehuanaca, Texas, according to S. P. Panas of Houston, president of the company. The plant will crush rock for road building purposes and agstone. New machinery and equipment have been installed at a cost of $50,000, it is stated. The quarry contains a plentiful supply of rock, and the fact that the district in which it is situated is soon to begin the construction of highways to cost nearly $2,000,000 is an assurance of a sufficient market for its product.

## Offer to Purchase Signal Mountain Portland Cement Co.

VARIOUS newspaper dispatches say offers have been made (from Chicago) to purchase the plant and business of the Signal Mountain Portland Cement Co. of Chattanooga, Tenn. Concerning this the *Chattanooga News* says:

"Details of the offer for purchase of the Signal Mountain Portland Cement Co. will be communicated to stockholders of the company, John L. Senior, president, stated. The cement official declined to give out particulars with regard to the offer, stating that he felt stockholders are entitled to receive this information first hand before it is made public.

"Mr. Senior is of the opinion that stockholders of the company will not care to consider the sale of the big industry. 'It is not expected that the offer will be accepted, as several of the larger holders of the company's stock have expressed themselves as not desiring to sell.'"

## New Gypsum Company Formed in Cleveland, Ohio

ANNOUNCEMENT of a new firm to enter the building supply field in Cleveland has been made by Maurice B. Jewett, who will head the new corporation known as the Cleveland Gypsum Co. This corporation will take over and operate the plaster mills of the Cleveland Builders Supply & Brick Co., and will specialize in mill mixed commodities.

The Cleveland Builders Supply mills produce sanded plaster, stucco, masons mix, cement topping and other mill prepared products, developed in years past by. Mr. Jewett, for many years was eastern representative of the United States Gypsum Co.., in New York City, and for the last dozen years has been manager of the plaster department of the Cleveland Builders Supply & Brick Co.

Associated with Mr Jewett in the new enterprise will be Burnam R. Smith, who before the war was with the Cleveland Macadam Co. and since has been a salesman for the Cleveland Builders Supply and Brick Co.

The offices of the new firm are in the Leader-News building.—*Cleveland News.*

## Dewey Portland Cement Company Distributes Large Bonus

TWO hundred forty-eight employes of the Dewey Portland Cement Co. at Dewey were made happy this Christmas by the distribution of something like $20,000 in bonus money by the company to employes who have served with the plant for a year or more. Nearly 100 other employes did not share in it because they had not been with the company for a year.

# Cement Products

TRADE MARK APPLIED FOR WITH U.S. PATENT OFFICE

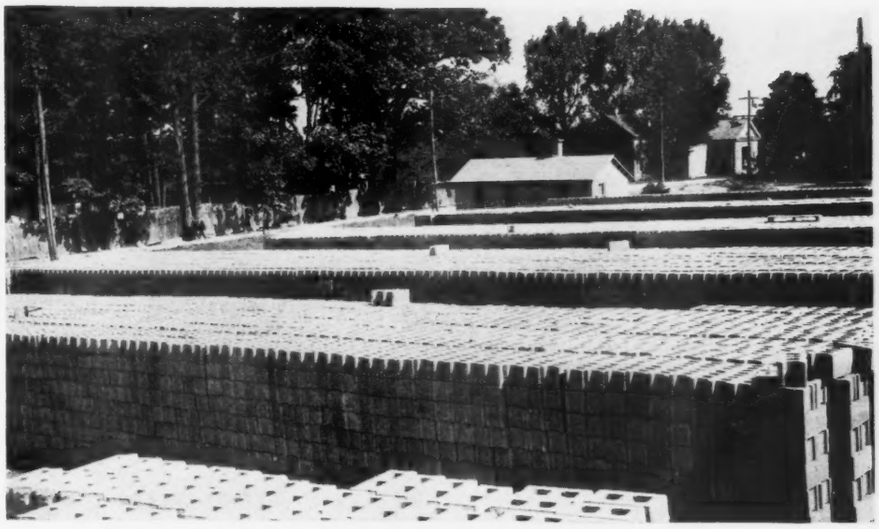
# Concrete-Block Manufacture as a Sideline for Sand and Rock Producers

## No Longer a Back-Yard Proposition

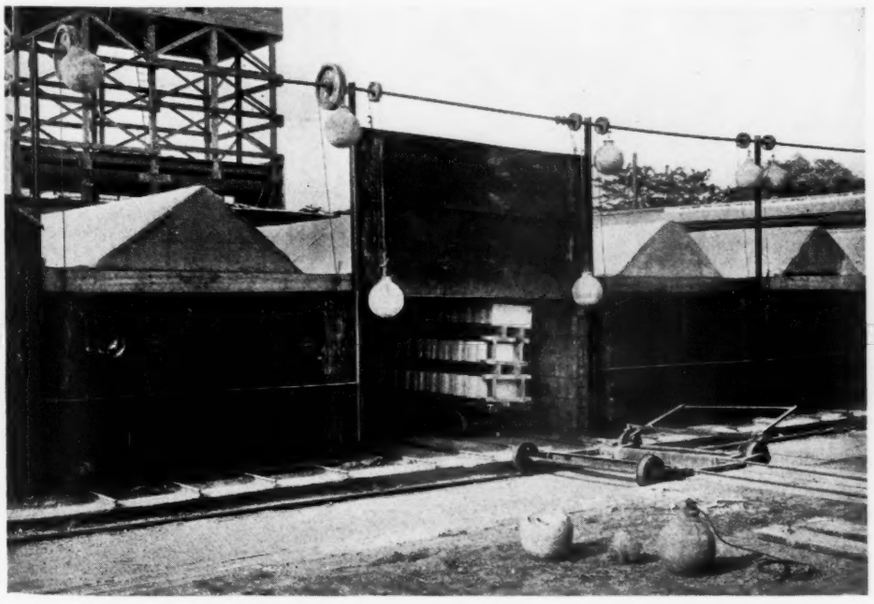
By A. J. R. Curtis

A QUARTER of a century ago, a concrete-block craze swept over the land, and people saw fortunes in concrete stone manufacture, dependent only on a $20 block mold, a supply of any kind of sand and $50 working capital. A multitude of molding devices sprang up and sold like hot cakes. The cheaper the process and the cheaper the molds the faster the sale of molds. Unscrupulous manufacturers took advantage until the back yards of every town and hamlet could yield a quota of junked concrete block machines, for the block were poor; and the "rock face design," at best, only an imitation of rouch pitched natural stone, was soon discredited by the public and thoroughly hated by the architects.

In some of the smaller localities conditions approximating those just described may persist unto the present, to a limited degree; but time has sifted out hundreds of manufacturers, and most of those remaining have learned through bitter experience that there is no money in making poor block, for there is no real market for poor block at any price. The new concrete block industry, persistently at work to perfect its mechanical processes, standardize, and raise the standards of its products, is constructed along entirely different lines.



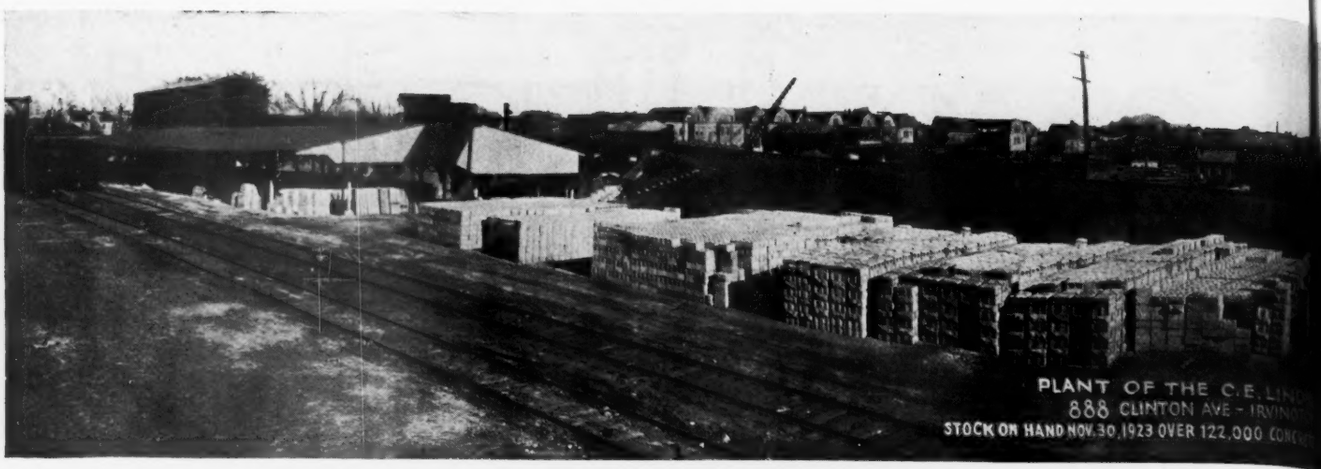
*A large, neatly arranged stockpile impresses purchasers and facilitates service. Recent studies of the concrete block industry indicate that a large stockpile is one of the greatest helps in increasing business*



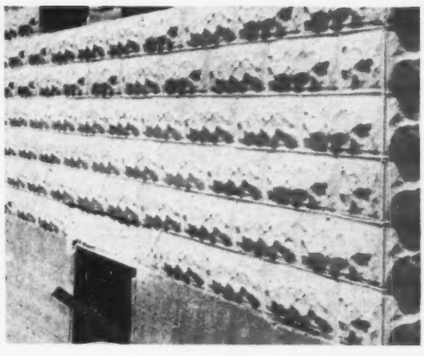
*Dependable quality is largely dependent on modern scientific curing methods*

The rapid growth in the popularity of concrete masonry during the past four or five years is a development so well known to readers of Rock Products that it hardly need be commented on. The industry has changed very largely from hand to machine methods. Plant output and plant capacity have increased tenfold. Over 30 factories each make more than a million block annually. The business has prospered, but is destined to far greater prosperity ahead.

One of the greatest weaknesses of the original concrete block industry was its absolute lack of definite information regarding methods, costs and selling, three elements which figure most prominently in the success or failure of any business. Today a great deal of such information is availa-




*The C. E. Lindsley Co., Irvington, N. J., is thoroughly sold on the practical value of a large stockpile*

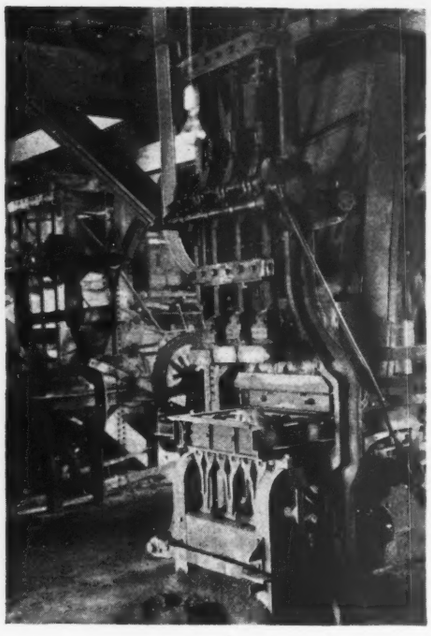


*The old imitation "rough ashlar" a thing of the past*

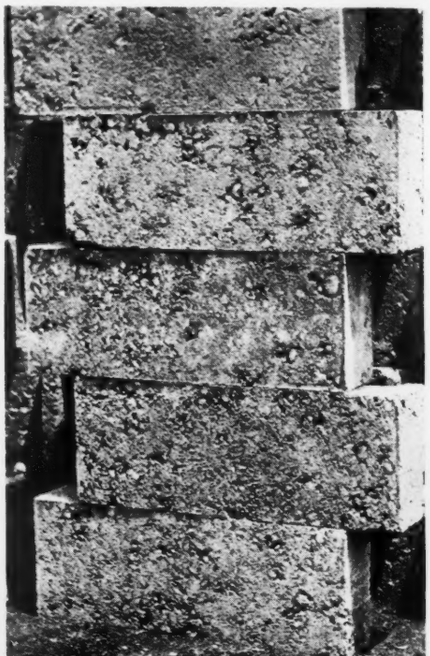
ble. As a consequence, failures in the concrete products industry are growing uncommon, and the chances of success have been multiplied manyfold.

At the start, the manufacturer of concrete block must so finance his business as to be able to install the best modern machinery and labor-saving devices; to employ competent help for the operation of the plant and first-class salesmen to dispose of the product.

In addition to the cost of equipment and buildings, his finances must be sufficient to cover cost of products in process of curing in completed stock pile and in purchaser's



*Modern concrete products factories are installing high-powered automatic equipment of large capacity*



*Modern foundation and wall blocks for stucco*

*Blocks with finished surfaces of special aggregates*

TABLE I

CAPITAL REQUIRED TO BUILD, EQUIP, AND OPERATE VARIOUS SIZE CONCRETE-BLOCK PLANTS—MACHINERY SCHEDULE

| Equipment Required | Output Per 8-Hour Day 400 | 800 | 1200 |
|---|---|---|---|
| Machine or machines | $ 700.00 | $ 1,400.00 | $ 2,500.00 |
| Pallets at 30 cents each | 150.00 | 250.00 | 450.00 |
| Cars and track or lift truck and racks | 500.00 | 1,000.00 | 1,500.00 |
| Mixer | 300.00 | 400.00 | 500.00 |
| Motor | 200.00 | 250.00 | 300.00 |
| Shafting, belts, etc. | 150.00 | 200.00 | 250.00 |
| Screen and conveyor for aggregates | 300.00 | 400.00 | 500.00 |
| Gravity conveyors for finished block | 150.00 | 200.00 | 300.00 |
| Installation and wiring | 250.00 | 350.00 | 450.00 |
| Tools | 200.00 | 250.00 | 300.00 |
| Miscellaneous | 300.00 | 400.00 | 600.00 |
| Total mechanical equipment | $ 3,200.00 | $ 5,100.00 | $ 7,650.00 |
| Building | 2,000.00 | 2,500.00 | 3,000.00 |
| Curing equipment, including boiler and piping | 500.00 | 800.00 | 1,000.00 |
| Curing tunnels | 1,000.00 | 1,600.00 | 2,200.00 |
| Material bins | ..... | 300.00 | 600.00 |
| Contingent | 400.00 | 600.00 | 1,200.00 |
| Total building investment | $ 3,900.00 | $ 5,800.00 | $ 8,000.00 |
| Total plant investment (exclusive of land) | 7,100.00 | 10,900.00 | 15,650.00 |
| Additional operating capital | 3,400.00 | 7,100.00 | 10,350.00 |
| Total capital required (exclusive of land) | $10,500.00 | $18,000.00 | $26,000.00 |

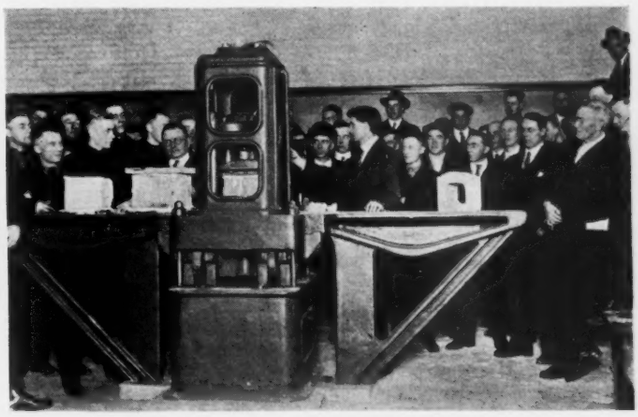
*sers care to buy only what they can examine in advance. A large stockpile guarantees quick delivery service*

possession during the credit period customary in the sale of building materials. Provision must also be made to cover delinquent accounts and for carrying raw materials in storage.

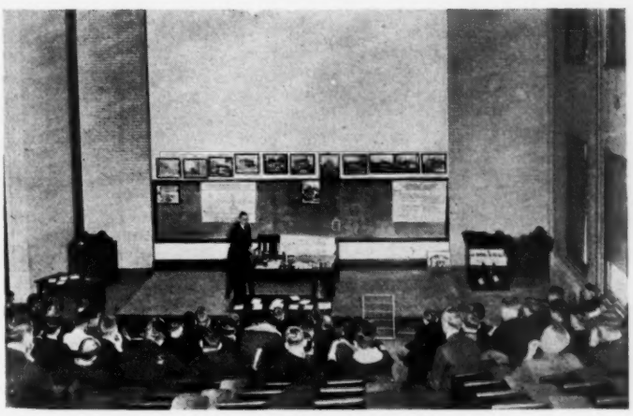
Approximate items of expense in equipping a plant for the manufacture of concrete block, given in Table I, indicate many expenditures commonly overlooked by the over-zealous prospective manufacturer. Experienced men in the business know that these items are sure to be confronted, so they must not be overlooked.

Relative equipment costs for producing 400, 800 and 1,200 8x8x16 in. concrete block per 8-hour day are set forth. Demonstrating that as the plant develops and daily output increases a relatively smaller amount of equipment is needed. Production costs are reduced in direct proportion to increased daily output. The output selected as a basis for these computations is reasonable and like all other values used in this article is extremely conservative. These computations will have to be corrected according to local conditions, type and make of equipment purchased, and efficiency of labor em-

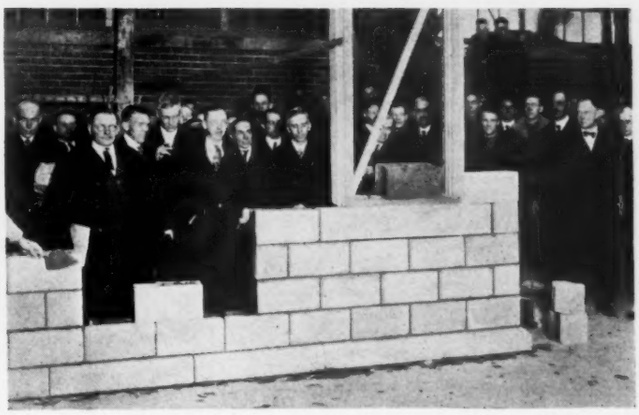
*A large part of the concrete block industry of today is going to school. Here is a class of Michigan block makers, from practically all parts of the state, studying the technique of block making in a course conducted at Michigan A. C.*



*Part of a class of 100 block makers learning the significance of the standard compression tests for concrete block and why their block should be tested at frequent intervals—Faith is founded on knowledge*



*An understand of the properties of gravel and stone, and the methods of detecting deficiencies and impurities, are important parts of the training which concrete block manufacturers are receiving*



*Good concrete block construction consists of good block well laid. Concrte block manufacturers are studying not only improved methods of block manufacture, but the best methods of laying, so as to give expert advice to users*

TABLE II. APPROXIMATE COST OF PRODUCING FOUR HUNDRED 8x8x16-IN. BLOCK PER DAY

| | | Cost for 400 | Cost per block |
|---|---|---|---|
| Cement aggregate: | | | |
| 23 sacks at 65c | | $14.95 | .037 |
| 6 cubic yards at $2.00 | | 12.00 | .03 |
| Direct labor: | | | |
| 1 operator at $5.00 | $5.00 | | |
| 1 helper at $3.50 | 3.50 | | |
| 1 mixer man at $4.00 | 4.00 | | |
| Total direct labor | | 12.50 | .031 |
| Manufacturing expense (per day): | | | |
| Liability insurance | $0.50 | | |
| Water | .25 | | |
| Fuel (curing and heat) | .60 | | |
| Power and light | 1.00 | | |
| Repairs to equipment | .75 | | |
| Miscellaneous | .50 | | |
| Total manufacturing expense | | 3.60 | .009 |
| Total direct cost | | $43.05 | .107 |
| General Expense (per year): | | | |
| Depreciation and obsolescence— | | | |
| Equipment, 25% of $3200.00 | $800.00 | | |
| Buildings, 5% of $3900.00 | 195.00 | | |
| Interest on investment, 7% of $10,500.00 | 735.00 | | |
| Taxes and insurance | 250.00 | | |
| Land rental, 6% of $2000.00 | 120.00 | | |
| Total overhead per year | $2100.00 | | |
| Total overhead per operating day | | $8.40 | .022 |
| Total cost for 400 block | | $51.45 | |
| Total cost per block, not including delivery cost, selling expense or profit | | | 12.9c |

TABLE III. APPROXIMATE COST OF PRODUCING EIGHT HUNDRED BLOCKS PER DAY

| | | Cost for 800 | Cost per block |
|---|---|---|---|
| Cement Aggregate: | | | |
| 46 sacks at 65c | | $29.90 | .037 |
| 12 cubic yards at $2.00 | | 24.00 | .03 |
| Direct labor: | | | |
| 2 operators at $5.00 | $10.00 | | |
| 2 helpers at $3.50 | 7.00 | | |
| 1 mixer man at $4.00 | 4.00 | | |
| Daily labor | | 21.00 | .026 |
| Manufacturing expense (per day): | | | |
| Liability insurance | $0.85 | | |
| Water | .40 | | |
| Fuel (curing and heating) | .90 | | |
| Power and light | 1.50 | | |
| Repairs to equipment | 1.50 | | |
| Miscellaneous | .75 | 5.90 | .008 |
| Total direct cost | | $80.00 | .101 |
| General expense: | | | |
| Depreciation— | | | |
| Equipment, 25% of $5100.00 | $1275.00 yr. | | |
| Buildings, 5% of $5800.00 | 290.00 yr. | | |
| Interest on investment, 7% of $1800.00 | 1260.00 yr. | | |
| Taxes and insurance | 375.00 yr. | | |
| Land rental, 6% on $3000.00 | 180.00 yr. | | |
| Total overhead per year | $3380.00 yr. | | |
| Total overhead per operating day | | 13.52 | .017 |
| Total cost of 800 block | | $94.32 | |
| Total cost per block exclusive of delivery cost, selling expense or profit | | | 11.8c |

TABLE IV. APPROXIMATE COST OF PRODUCING TWELVE HUNDRED BLOCKS PER DAY AUTOMATIC MACHINE

| | | Cost for 1200 | Cost per block |
|---|---|---|---|
| Cement aggregate: | | | |
| 69 sacks at 65c | | $44.85 | .037 |
| 18 cubic yards at $2.00 | | 36.00 | .03 |
| Direct labor: | | | |
| 1 operator at $6.00 | $6.00 | | |
| 1 off bearer at $4.00 | 4.00 | | |
| 2 helpers at $3.50 | 7.00 | | |
| 1 mixer man at $4.00 | 4.00 | | |
| Daily labor | | 21.00 | .018 |
| Manufacturing expense (per day): | | | |
| Liability insurance | $0.85 | | |
| Water | .60 | | |
| Fuel (curing and heating) | 1.50 | | |
| Power and light | 2.50 | | |
| Repairs to equipment | 3.00 | | |
| Miscellaneous | 1.25 | 9.70 | .008 |
| Total direct cost | | $111.55 | .093 |
| General expense: | | | |
| Depreciation— | | | |
| Equipment, 25% of $7650.00 | $1910.00 | | |
| Buildings, 5% of $8000.00 | 400.00 | | |
| Interest on investment, 7% of $26,000.00 | 1820.00 | | |
| Taxes and insurance | 500.00 | | |
| Land rental, 6% on $5000.00 | 300.00 | | |
| Total overhead per year | $4930.00 | | |
| Operating day | | 19.72 | .017 |
| Total cost of 1200 block | | $131.27 | |
| Total cost per block exclusive of delivery cost, selling expense or profit | | | 11.0c |

ployed.

Note that depreciation and maintenance are figured very high. Much of the machinery used in this industry is still in the process of development. Improvements in machine design and plant enlargement are frequent. As at present constructed, many of the machine parts require replacement and repair, due largely to the inherent difficulties naturally encountered in handling such a material as concrete.

To produce 400 8x8x16 in. block per day, which at 28 days will meet the American Concrete Institute Standard for Concrete Block (700 lb. per sq. in. gross area compression) the following approximate computations are presented in Table II:

In estimating the cost of producing block with the three groups of equipment listed it is assumed that the plant will operate continuously for 250 eight-hour days per year. A prospective manufacturer can determine his estimated production cost by correcting for local costs of labor and mateial.

To produce 800 block per day under the same general conditions the following relative computations are given in Table III.

To produce 1,200 block under the same same general conditions the relative computations are given in Table IV.

### *Cost of Laying Block*

The chief economy in concrete block wall construction is in the labor and mortar required to lay them. The following figures are typical of the savings that are made by building with concrete block. They should be corrected to correspond with local costs when applying them to any local situation.

These figures show that it costs 33% more to build an 8-in. brick wall than a concrete block wall of the same thickness and a 12-in. brick wall costs 40% more than

COMPARATIVE COST OF MASONRY WALLS IN PLACE

| | | |
|---|---|---|
| Cost of 100 sq. ft.—8-in. brick wall: | | |
| 1300 brick at $18 per M | $23.40 | |
| 18 cu. ft. mortar at 40c | 7.20 | |
| Labor (1000 brick per day): | | |
| Masons, 10.4 hours at $1.25 | 13.00 | |
| Tenders, 13 hours at $0.75 | 9.75 | |
| Total cost 100 sq. ft. | | $53.35 |
| Total cost per sq. ft. | | .53 |
| Total cost per cu. ft. | | .80 |
| Cost of 100 sq. ft.—8-in. concrete block wall: | | |
| 110 block at $250 per M | $27.50 | |
| 5 cu. ft. mortar at 40c | 2.00 | |
| Labor (175 per day): | | |
| Masons, 5 hours at $1.25 | 6.25 | |
| Tenders, 5 hours at $0.75 | 3.75 | |
| Total cost per 100 sq. ft. | | $39.50 |
| Total cost per sq. ft. | | .39½ |
| Total cost per cu. ft. | | .60 |
| Cost of 100 sq. ft.—12-in. brick wall: | | |
| 1950 brick at $18 per M | $35.10 | |
| 27 cu. ft. of mortar at 40c | 10.80 | |
| Labor (1200 brick per day): | | |
| Masons, 13 hours at $1.25 | 16.25 | |
| Tenders, 16.2 hours at $0.75 | 12.20 | |
| Total cost per 100 sq. ft. | | $74.35 |
| Total cost per sq, or cu. ft. | | .74 |
| Cost of 100 sq. ft.—12-in. concrete block wall: | | |
| 110 concrete block at $340 per M | $37.40 | |
| 7.7 cu. ft. of mortar at 40c | 3.08 | |
| Labor (140 per day): | | |
| Masons, 6 hours at $1.25 | 7.50 | |
| Tenders, 6 hours at $0.75 | 4.50 | |
| Total cost per 100 sq. ft. | | $52.48 |
| Total cost per sq. or cu. ft. | | .52½ |

a 12-in. concrete block wall. The figures quoted are for straight run of wall using portland cement mortar and do not include staging, cleaning down, etc., which will be the same for either type.

From these figures, which are very conservative, it will be seen that even though the concrete block costs a little more than an equivalent volume of brick the large savings in mortar and laying make its use very profitable to the builder. In this computation brick has been given a price spread which is conservative and brick masons have been credited with a high average number of brick laid per day. The number of block laid per day is a minimum and is generally exceeded from 10 to 30%.

Relatively, a small proportion of the building public has anything like a true conception of the superior construction features offered by the combination of concrete block, cement mortar and cement stucco. Extensive British government tests have shown that the stability of concrete masonry walls is fully twice as great as that of clay brick walls of equal thickness. Columbia University, Lewis Institute and other tests have shown that concrete units of a given strength produce masonry twice as strong in compression as where clay units are used. The uniformity in shape, absorption, suction, texture and many other important qualifications makes concrete masonry the most economical and generally desirable base for stucco.

These considerations explain why concrete masonry units have had such a steadily increasing demand and give every assurance of even greater success during the season ahead.

COMPARISON OF COST OF LAYING CONCRETE BLOCK AND CLAY BRICK MASONRY

| | Common brick laid per eight-hour day | 8x8x16-in. concrete block laid per eight-hour day | Common brick required to equal wall volume of concrete block | Ratio of wall volume of concrete block to common brick laid per eight-hour day | Relative labor cost to lay 8-in. concrete block wall compared to equal volume brick wall |
|---|---|---|---|---|---|
| ALABAMA: | | | | | |
| Fairhope | 1000 | 200 | 2600 | 2.60 | 38.5% |
| CALIFORNIA: | | | | | |
| Holtville | 1000 | 75 | 975 | .975 | 105.0% |
| Lodi | 1000 | 175 | 2275 | 2.27 | 44.0% |
| DELAWARE: | | | | | |
| Wilmington | 800 | 200 | 2600 | 3.25 | 37.0% |
| FLORIDA: | | | | | |
| Daytona | 1500 | 200 | 2600 | 1.73 | 57.7% |
| Miami | 1200 | 200 | 2600 | 2.17 | 46.0% |
| ILLINOIS: | | | | | |
| Benton | 800 | 250 | 3250 | 4.06 | 24.6% |
| Centralia | 800 | 225 | 2925 | 3.66 | 27.3% |
| Chicago | 1200 | 150 | 1950 | 1.62 | 61.7% |
| Danville | 1500 | 200 | 2600 | 1.73 | 57.7% |
| Granite City | 800 | 200 | 2600 | 3.25 | 30.7% |
| Mobile | 1200 | 250 | 3250 | 2.71 | 35.9% |
| Oak Park | 1200 | 150 | 1950 | 1.62 | 61.7% |
| Peoria | 1100 | 180 | 2340 | 2.13 | 46.9% |
| Rockford | 1200 | 190 | 2470 | 2.05 | 48.7% |
| East St. Louis | 1600 | 200 | 2600 | 1.62 | 61.7% |
| INDIANA: | | | | | |
| Gary | 1100 | 250 | 3250 | 2.95 | 33.9% |
| Indianapolis | 1000 | 350 | 4550 | 4.55 | 22.0% |
| Hammond | 1200 | 225 | 2925 | 2.43 | 41.1% |
| Fort Wayne | 800 | 200 | 2600 | 3.25 | 37.0% |
| South Bend | 600 | 135 | 1755 | 2.92 | 34.2% |
| IOWA: | | | | | |
| Council Bluffs | 1200 | 250 | 3250 | 2.71 | 35.9% |
| Davenport | 800 | 300 | 3900 | 4.88 | 20.5% |
| Red Oak | 1700 | 275 | 3575 | 2.1 | 47.7% |
| KENTUCKY: | | | | | |
| Ashland | 1100 | 225 | 2025 | 1.84 | 54.4% |
| Covington | 1100 | 300 | 3900 | 3.54 | 28.2% |
| Lexington | 1100 | 275 | 3575 | 3.25 | 37.0% |
| MASSACHUSETTS: | | | | | |
| East Boston | 1200 | 250 | 3250 | 2.71 | 35.9% |
| Springfield | 1000 | 175 | 2275 | 2.27 | 44.0% |
| MICHIGAN: | | | | | |
| Detroit | 1000 | 200 | 2600 | 2.6 | 38.5% |
| Galien | 1200 | 150 | 1950 | 1.6 | 62.5% |
| MINNESOTA: | | | | | |
| Parkers Prairie | 1500 | 300 | 3900 | 2.6 | 38.5% |
| NEBRASKA: | | | | | |
| Howells | 2000 | 150 | 1950 | .975 | 105.0% |
| Omaha | 1200 | 300 | 3900 | 3.25 | 31.0% |
| NEW JERSEY: | | | | | |
| Atlantic City | 1200 | 200 | 2600 | 2.17 | 46.0% |
| East Orange | 800 | 250 | 3250 | 4.06 | 24.6% |
| Egg Harbor City | 800 | 150 | 1950 | 2.44 | 41.0% |
| Millville | 1000 | 200 | 2600 | 2.6 | 38.5% |
| Woodbury | 700 | 400 | 5200 | 7.4 | 13.5% |
| Woodlyn | 800 | 200 | 2600 | 3.25 | 31.0% |
| NEW YORK: | | | | | |
| Brooklyn | 1200 | 250 | 3250 | 2.7 | 36.0% |
| Jamaica | 1000 | 250 | 3250 | 3.25 | 30.7% |
| Middletown | 800 | 100 | 1300 | 1.6 | 62.5% |
| Newburgh | 1000 | 250 | 3250 | 3.25 | 31.0% |
| New York | 1500 | 250 | 3250 | 2.17 | 46.0% |
| Ogdensburg | 500 | 100 | 1300 | 2.6 | 38.5% |
| Watertown | 800 | 125 | 1625 | 2.03 | 49.2% |
| OHIO: | | | | | |
| Cleveland | 800 | 130 | 1690 | 2.05 | 48.7% |
| Columbus | 2000 | 230 | 2990 | 1.5 | 66.6% |
| Lorain | 1200 | 300 | 3900 | 3.34 | 30.0% |
| Pandora | 1250 | 150 | 1950 | 1.56 | 64.4% |
| Toledo | 2000 | 190 | 2470 | 1.24 | 80.6% |
| OREGON: | | | | | |
| Corvallis | 1000 | 225 | 2925 | 2.92 | 34.2% |
| Eugene | 1200 | 225 | 2925 | 2.44 | 41.0% |
| Portland | 800 | 75 | 975 | 1.22 | 83.2% |
| PENNSYLVANIA: | | | | | |
| Allentown | 850 | 150 | 1950 | 2.3 | 43.4% |
| Bethlehem | 800 | 200 | 2600 | 3.25 | 30.7% |
| Dorranceton | 700 | 200 | 2600 | 3.71 | 26.9% |
| Erie | 1000 | 190 | 2470 | 2.47 | 40.4% |
| Grove City | 1200 | 250 | 3250 | 2.7 | 36.0% |
| Lancaster | 800 | 350 | 4550 | 5.68 | 17.6% |
| Lemoyne | 800 | 200 | 2600 | 3.25 | 37.0% |
| Lewisburg | 800 | 130 | 1690 | 2.11 | 47.3% |
| Lewiston | 800 | 300 | 3900 | 4.87 | 20.6% |
| Monaca | 2500 | 200 | 2600 | 1.04 | 96.1% |
| Newcastle | 1000 | 200 | 2600 | 2.6 | 38.5% |
| Oakmont | 1000 | 125 | 1625 | 1.62 | 61.7% |
| Pittsburgh | 800 | 150 | 1950 | 2.44 | 41.0% |
| Sayre | 750 | 100 | 1300 | 1.73 | 57.7% |
| Springdale | 700 | 300 | 3900 | 5.57 | 17.9% |
| Stroudsburg | 900 | 240 | 3120 | 3.46 | 28.9% |
| Wesleyville | 1000 | 200 | 2600 | 2.6 | 38.5% |
| Wilkes Barre | 800 | 200 | 2600 | 3.25 | 30.7% |
| Williamsport | 900 | 100 | 1300 | 1.44 | 69.4% |
| Wyoming | 850 | 200 | 2600 | 3.06 | 32.6% |
| York | 600 | 250 | 3250 | 5.41 | 18.3% |
| WEST VIRGINIA: | | | | | |
| Huntington | 1000 | 600 | 7800 | 7.8 | 12.8% |

## Building Officials' Conference to Study Hollow Building Units

THE Building Officials' Conference, which will hold its 11th annual meeting in Madison, Wis., within a few months, has appointed a committee on hollow building units to prepare a model building code section covering these materials. The committee's report is to be ready in advance of the forthcoming annual meeting. It will be in a form that may be incorporated bodily as a section of a general city building code for the regulation of the manufacture and use of building units, such as hollow concrete block and tile and hollow clay tile.

The chairman of the committee is W. C. Muehlstein, building engineer of the Industrial Commission of Wisconsin, Madison, Wis. Other members of the committee are Wm. C. E. Becker, building commissioner of St. Louis; Robert Knight, deputy building commissioner of Chicago; W. L. Harrison, building commissioner of Richmond, Va.; Norman M. Stineman, structural engineer, Portland Cement Association, Chicago, and F. J. Huse, chief engineer, Hollow Building Tile Association, Chicago.

# Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert
Munsey Building, Washington, D. C.

## Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning January 12:

### Illinois Freight Association Docket

2961. Sand, gravel and dirt. Carload, minimum weight, 90% of marked capacity of car, except when car is loaded to full cubical or visible capacity, actual weight will apply, from Morocco, Ind., to various destinations in I. R. C. territory, e. g. (in cents per net ton):

| To | Present | Proposed |
|---|---|---|
| Danville, Ill. | 167 | 69 |
| Steward, Ind. | 190 | 69 |
| Kentland, Ind. | 150 | 50 |
| Cook, Ind. | 200 | 69 |
| Highlands, Ind. | 200 | 69 |

136-A. Slag. Carloads, from Joliet, Ill., to La Salle, Ill. Present, $1.14 per net ton; proposed, classification basis, account no movement.

2936-A. Stone, sand and gravel. Carloads, minimum weight 90% of marked capacity of car, from Joliet district to Lovington, Ill. Present, 12½ cents per 100 lb.; proposed, $1.13 per net ton.

2939. Sand and gravel. Carloads, minimum weight marked capacity of car, except when loaded in open cars to full visible capacity, actual weight to apply, from Mackinaw and Lincoln, Ill., to B. & O. R. R. stations, Rochester to Taylorville, Ill., inclusive. Present, $1.01 per net ton; proposed, 88 cents per net ton.

2942. Sand, gravel, and sand and gravel pit strippings. Carloads, minimum weight 90% of marked capacity of car, except when loaded to full visible capacity actual weight will apply, but in no case less than 40,000 lb., from Beloit, Afton, Wis., and South Beloit, Ill., to Camp Grant, Ill. Present, 5 cents; proposed, 75 cents per net ton.

2951. Sand and gravel. Carloads, minimum weight capacity of car, to Tower Hill, Lakewood and Cowden, Ill. (in cents per net ton):

| From | Present | Proposed |
|---|---|---|
| Lincoln, Ill. | 113 | 101 |
| Pekin, Ill. | 126 | 114 |

2952. Sand, gravel and crushed stone. Carloads, minimum weight capacity of car, to Mo.-Ill. R. R. stations, Salem, Ill., to Evansville, Ill., inclusive (in cents per net ton):

| From | Proposed |
|---|---|
| *Palestine, Ill. | 128 |
| *Lincoln, Ill | 126 |
| *Cairo, Ill | 126 |
| *Metropolis, Ill. | 126 |
| *Pekin, Ill. | 141 |
| †Shetlerville, Ill. | 126 |

Present, combination rates apply. *Sand and gravel. †Crushed stone.

2958. Sand and gravel. Carloads, minimum weight marked capacity of car, except when car is loaded to full visible capacity, actual weight, but not less than 40,000 lb., from Peoria, Ill., to Midlothian, Tinley Park, Mokena and New Lenox, Ill. Present, class E; proposed, $1 per net ton.

2959. Sand, gravel and crushed stone. Carloads, minimum weight marked capacity of car, to Seaton, Ill. (in cents per net ton):

| From | Present | Proposed |
|---|---|---|
| *Lincoln, Ill. | 147 | 126 |
| †Lehigh, Ill. | 140 | 130 |
| †Thornton, Ill. | 151 | 139 |

*Sand and gravel. †Crushed stone.

2960. Sand and gravel. Carloads, minimum weight 90% of marked capacity of car, except when loaded to full visible capacity, actual weight, from Oswego and Yorkville, Ill., to Saluda, Ill. Present, $1.26; proposed, $1.13 per net ton.

2964. Sand and gravel. Carloads, minimum weight 90% of marked capacity of car, except when loaded to full visible capacity, actual weight to apply (in cents per net ton):

| To | From Yorkville Pres. | Prop. | From Sheridan Pres. | Prop. | From Ottawa Pres. | Prop. |
|---|---|---|---|---|---|---|
| Oregon | 101 | 88 | ..... | .... | 101 | 88 |
| Honey Creek | 101 | 88 | 101 | 88 | 101 | 88 |
| Chana | ..... | .... | ..... | .... | 101 | 88 |
| Flag Center | ..... | ..... | .... | ..... | .... | 101 | 88 |

2965. Sand and gravel. Carloads, minimum weight 90% of marked capacity of car, except when loaded to full visible capacity, actual weight, from Yorkville, Ill., to various I. R. C. destinations, e. g. (in cents per net ton):

| To | Present | Proposed |
|---|---|---|
| Wyanet, Ill. | 90 | 88 |
| Henderson, Ill. | 126 | 113 |
| Douglas, Ill. | 126 | 113 |
| Bader, Ill. | 151 | 139 |

2585-D. Sand, silica. Minimum weight 90% of marked capacity of car, except when loaded to full visible capacity of car, actual weight, but not less than 40,000 lb., from Millington, Oregon, Sheridan, Utica and Wedron, Ill., to Decatur, Ill. (per net ton): Present, $1.64; proposed, $1.30.

2969. Sand. Minimum weight 90% of marked capacity of car, except when loaded to full visible capacity, actual weight, from Arenzville and Tamalco, Ill., to Alton and Federal, Ill. Present, classification basis; proposed, 101 per net ton.

2971. Sand. Minimum weight 90% of marked capacity of car, except when loaded to full visible capacity of car, actual weight, but not less than 40,000 lb., from Ottawa and Utica, Ill., to Springfield, Ill. (in cents per net ton): Present, 164; proposed, 150.

### Southern Freight Association Docket

18071. Cement. It is proposed to amend Agent Glenn's Cement Tariff 4, L. C. C. A455, so as to authorize Chattanooga, Tenn., rates on cement, carloads, usual description, from North Chattanooga, Tenn., to all destinations shown in tariff mentioned.

18086. Cement. It is proposed to reduce present rates on cement, carloads, from Portland and Rockmart, Ga., to Camilla and Pelham, Ga., to be the same as currently in effect from these points to Thomasville, Ga., i. e., 19 cents per 100 lb.

18094. Intermediate destination rule. It is proposed to publish an intermediate destination rule in connection with rates on cement, carloads, as shown in Item 645 of Agent Boyd's Tariff 167B, I. C. C. A1427, from Kansas City, Mo., and points taking same rates; also points in Kansas and Dewey, Okla., named in item of tariff referred to, to Memphis, Tenn., Helena, Ark., Vicksburg, Miss., Natchez, Miss., New Orleans, La., and points taking same rates as named on pages 37 to 54 of tariff. No intermediate commodity rate rule now in effect, necessitating the application of combination rates to intermediate points not specified.

18118. Sand (except molding or glass). Carloads, from Petersburg, Va. (intrastate), to So. Ry. stations, viz.: Pleasant Shade, Freeman, Edgerton and Lawrenceville, Va. It is proposed to reduce present rates to be as follows: To Lawrenceville, $1.39; to other points named, $1.28 per net ton, based on Emporia, Va., combination; also same as in effect from Arundel Siding and Old Dominion Siding, Va.

18129. Sand and gravel. It is proposed to establish rates on sand and gravel, straight or mixed carloads, from Georgetown, Ga. (C. of Ga. Ry.), to stations on the Central of Georgia Ry., Columbus to Raymond, Ga., inclusive; to stations on the A. C. L. R. R., Valdosta to Bainbridge, Ga., inclusive, and to stations on the S. A. L. Ry. between Savannah and Thalmann, Ga., on the same basis, distance considered, as in effect from pits in the Montgomery, Ala., district. Proposed revision represents reductions, and statement of present and proposed rates will be furnished interested parties upon request.

18130. Stone, crushed stone, rubble, stone screenings, slag, chert and gravel. Carloads, from Bolingbroke, Ga., to points named below. In lieu of present combination rates, it is proposed to establish the following rates: To Douglas, Ga., $1.53; Madison, Fla., $1.62; Moultrie, Ga., $1.58; Nashville, Ga., $1.58; Swainsboro, Ga., $1.58; Willacooche, Ga., $1.58 per net ton. Proposed rates are the same as suggested in Submittal 17864 from Holton, Ga.

18136. Crushed stone, etc. Carloads, from Holton and Stockbridge, Ga., to Ellaville, Fla. Present, from Stockbridge, $2.47; proposed, $1.85. From Holton, present, $2.35; proposed, $1.76 per net ton, based on the carriers' proposed Georgia scale.

### Central Freight Association Docket

9873. Stone, crushed; stone screenings and agricultural limestone (not ground or pulverized), in bulk, Corydon, Ind., to Indiana in cents per net ton, from Corydon, Ind.:

| To | Proposed |
|---|---|
| Marysville, Ind. | 106 |
| Vincennes, Ind. | 130 |
| Mt. Vernon, Ind. | 140 |
| Owensville, Ind. | 130 |
| Ft. Branch, Ind. | 130 |
| Hazleton, Ind. | 120 |
| Poseyville, Ind. | 140 |
| Salem, Ind. | 120 |
| Cynthiana, Ind. | 130 |
| Washington, Ind. | 125 |
| Petersburg, Ind. | 125 |
| N. Harmony, Ind. | 140 |
| Jeffersonville, Ind. | 104 |
| Scottsburg, Ind. | 124 |
| Henryville, Ind. | 124 |

9878. Cement. Mitchell, Ind., to Louisville, Ky. Present, 10 cents; proposed, 8½ cents.

9879. Sand and gravel. Zoarville, Ohio, to Ashtabula, Ohio. Present, $1.20 per net ton; proposed, $1.40 per net ton.

9882. Sand and gravel. Coshocton, Ohio, to Ohio (in cents per net ton):

| To | Present | Proposed |
|---|---|---|
| Zanesville | 90 | 80 |
| Ellis | 90 | 70 |
| Trinway | 90 | 70 |
| Adams Mills | 90 | 70 |
| Conesville | 90 | 70 |
| Baltic | 80 | 70 |
| Sugar Creek | 90 | 70 |
| Justus | 110 | 80 |
| Harmon | 110 | 80 |
| Canton | 110 | 90 |
| Kent | 120 | 110 |
| Brewster | 120 | 90 |
| Orrville | 120 | 90 |
| Lodi | 120 | 110 |
| Wellington | 120 | 110 |
| Bolivar | 120 | 90 |
| Zoar | 120 | 90 |
| Valley Junction | 120 | 90 |
| Sherrodsville | 140 | 100 |
| Minerva Junction | 120 | 100 |
| Scio | 140 | 110 |
| Pittsburgh Junction | 140 | 110 |
| Adena | 140 | 110 |
| Akron | 120 | 110 |
| Cambridge | 140 | 90 |

9911. Gravel and sand, except blast, engine, foundry, glass, molding or silica sand. Jamestown and Hadley, Penn., to Ohio and Pennsylvania (in cents per net ton):

| From Jamestown, Penn. Present | Proposed | From Hadley, Penn. Present | Proposed |
|---|---|---|---|
| 80 | 80 | 105 | 90 |
| 80 | 80 | 105 | 90 |
| 90 | 80 | 105 | 90 |
| 105 | 80 | 105 | 90 |
| 105 | 80 | 105 | 90 |
| 105 | 80 | 105 | 90 |
| 80 | 80 | 115 | 90 |
| .... | 80 | 115 | 90 |
| 80 | 80 | 115 | 90 |
| 90 | 80 | 115 | 90 |
| 105 | 90 | 115 | 105 |
| 105 | 90 | 115 | 105 |
| 80 | 80 | 115 | 90 |
| 115 | 115 | ..... | 115 |

9924. Stone, rip rap and rubble. Neshannock Falls, Penn., to Birmingham, Mich. Present, 23 cents; proposed, $3.15 per net ton.

9925. Sand, loam, glass, molding or silica. Zanesville, Nesilton, Overpeck and Cincinnati, Ohio, to Rochester and Port Huron, Mich. Present, $3.15 per net ton; proposed, $2.52 per net ton.

9927. Crushed stone. Kenton, Ohio, to East Liberty, Zanesfield, Bellefontaine, McMoran, Lewistown, Russels Point, Lake View, Santa Fe, Gutman, Wapakoneta, Moulton and St. Marys, Ohio. Present, 80 cents per net ton; proposed, 70 cents per net ton.

9921. Molding sand. From pits in vicinity of Brazil, Ind., to Illinois, Indiana, Iowa, Michigan, Missouri, Ohio and Wisconsin. Proposed, as per Exhibit A.

### Southwestern Freight Bureau Docket

3298. Cement. To establish the following rates on cement, portland, hydraulic and paving, in straight or mixed carloads, minimum weight 50,000 lb., from Eagle Ford, Ft. Worth and Harrys, Texas (rate in cents per 100 lb.): To stations on the N. I. & N. Ry., Walter Spur, Index No.

11950; to Patterson, La., Index No. 12260, inclusive, 29; to stations Albert, Index No. 12265, to Jefferson Island, Index No. 12297, inclusive, 33. It is desired to line up points on the N. I. & N. R. R., competitive with points on the M. L. & T. R. R. and also to eliminate violations of the fourth section, and also to comply with I. C. C. Fourth Section Order No. 8909.

3313. Sand. To establish a rate of 15½ cents per 100 lb. on sand, carloads, minimum weight 90% of marked capacity of car, from Guion, Ark., to Oklahoma City, Okla. Shippers state that class basis is prohibitive and request the publication of rates comparable with rates to Ada and Blackwell, Okla.

3361. Gravel. To establish the 9702 Joint Line Scale, plus 1 cent per 100 lb., on gravel, carloads, minimum weight 80,000 lb., from Willaco, Ark., to points in Texas on the T. & P. Ry., shown below: Kildare, Lodi, Stalls, Jefferson, Argo, Nash, Gravel Pit, Leary, 14 Mile Siding, Hooks, New Boston, Sulphur, Domino, Springdale, Richey's, Lanark, Queen City, Atlanta, Galloway, Bivins, Wayne, Bancker, Whaley's. Shippers state that they will be at a great disadvantage when rates authorized from Neal Springs, Ark., are published, and request publication of same rates from Willaco, Ark.

3363. Cement. To establish a rate of 23 cents per 100 lb. on cement, carloads, as described in S. W. L. Trf. 90E, from Harrys and Eagle Ford, Texas, to stations on the W. & O. V. Ry. It is stated that a rate of 23 cents per 100 lb. has been proposed to Warren, Ark., on the Mo. Pac. R. R., which point is the connection with the W. & O. V. Ry., and shippers request publication of this rate to stations on the W. & O. V.

3412. Sand. To establish a rate of 16½ cents per 100 lb. on sand, carloads, minimum weight 80,000 lb. or marked capacity of car if less than 80,000 lb., from Guion, Ark., to Houston, Texas. Shippers state that present class basis is prohibitive and claim that the basis proposed is the maximum rate on which they can expect to do any business.

**Trunk Line Association Docket**

12386. To cancel commodity rates published in Agent Cottrell's I. C. C. No. 464, on cement, natural or portland (building cement), carloads, from Cumberland, Md., to Southern points, account rates being obsolete. Classification basis to apply.

**Texas-Louisiana Tariff Bureau Docket**

1534-LA. Sand and gravel. Carloads, from Shreveport, La., to L. L. points in Louisiana. Proposition from carriers to extend the 9702 rates on sand and gravel from Shreveport, La., to all points in Louisiana to apply on asphalt coated stone. It is stated there is a plant at Shreveport which treats stone to be used for resurfacing gravel roads.

## Rock Product Producers and Dealers Form Association in Los Angeles

A NEW leaf has been turned over by the producers and dealers handling rock products and sand in Los Angeles. Following closely on the heels of the new year, 50 dealers and producers gathered together on the evening of the sixth of January and did several things. First they inaugurated a new selling plan for the commodities. These will be sold on a tonnage basis in the future rather than on a yardage basis. This is revolutionary in itself, at least so far as this territory is concerned. The benefits or defects of the plan will quickly be shown after practice of the scheme for a few weeks or months.

The new association also hopes to put a stop to the bad habit of cut-throat methods that are bound to occur at times of bitter competition. Of course the association does not expect to set prices. That is hardly safe in these days of anti-trust laws, but the new friendly feeling that is bound to prevail will do away with many of the former imagined grievances arising from time to time. Also the interchange of ideas is bound to be helpful to everyone concerned.

The organization has honored Herbert Reid, president of Reid-Platt-Spear, Inc., who is a live member in the trade at Los Angeles. Fred W. Schaer was elected to serve as vice-president. Mr. Schaer is connected with the Hammond Lumber Co. of Los Angeles. The treasurer is J. R. Allder of the Atlas Mixed Mortar Co. of the same city. The new organization will not conflict in any way with other organizations in the building supply field. The dealers and producers are very enthusiastic over the new enterprise and much benefit is expected from it.

## Eastern Lime Manufacturers May Intervene in Rate Case

THE Eastern Lime Manufacturers' Traffic Bureau and Lime Industries of Virginia have been authorized to intervene in No. 16278, Grangers Manufacturing Company vs. N. Y. C. R. R. et al.—*Traffic World.*

## E. P. Monaghan's Picture, Not George F. Bayle

THE portrait below is that of F. P. Monaghan, superintendent of the Glens Falls Portland Cement Co., Glens Falls, N. Y. This picture was shown on page 70 of the December 27 number of Rock Products, and through error, carried the name of the vice-president of the company, George F. Bayle, Jr.

***F. P. Monaghan, superintendent of the Glens Falls Portland Cement Co.***

## New York Has Large Supplies of Aggregate

THE *Dow Service Building Reports* says that New York has an unusual amount of building material in reserve and mentions that the stocks of sand carried total 75,000 tons, of gravel 40,000 tons, and that crushed stone stocks are in proportion. Dealers have been stocking up in anticipation of a rush for building material which is expected before March 15. There has been a considerable carryover of construction in the city, estimated at 4216 structures, valued at $51,172,000.

## Rock Asphalt Company to Have Headquarters at Evansville, Indiana

THE distributing center for the entire output of the Rock Asphalt Co. of America, incorporated at $1,000,000, will be located in Evansville, Ind., between now and spring, it was announced a few days ago. The company has decided to locate a rail and river transfer station, storage rooms, laboratories and general offices in Evansville, according to good authority. Negotiations for a five-year lease on a strip of river front land 720 ft. long are now being conducted, the officials of the asphalt company say. William E. Massey of Louisville, head of the Ryan-Hampton Tobacco Co., is the president of the Rock Asphalt Co.

## Sand and Gravel Prices in Indiana

THE *Tell City, (Ind.,) News* publishes the following account of lettings for furnishing gravel to county roads:

"There were three bidders to furnish 5,000 yd. of gravel required by the county maintenance department next year.

"The Tell City Sand & Gravel Co. proposed to put half of this amount on the bank at Derby and Dodd at 97 cents per yard and the remainder at Tell City at $1 per yard.

"The Koch Sand & Gravel Co., formerly the Evansville Sand & Gravel Co., made a price of 97½ cents per yard.

"The Bedford-Nugent Co. was low with a bid of 84 cents per yard. Naturally they were awarded the contract.

## Tariff on Silica Sand Ordered Revised

THE public service commission has ordered the Pennsylvania Railroad Co., Baltimore and Ohio Railroad Co. and the Winfield Railroad Co. to revise their tariff on the shipment of silica sand between Emlenton and Foxburg. Complaint against present rates was filed by the Richland Sand Products Co.—*Pittsburgh (Penn.) Post.*

# The Rock Products Market

## Wholesale Prices of Crushed Stone

**Prices given are per ton, F. O. B., at producing plant or nearest shipping point**

### Crushed Limestone

| City or shipping point | Screenings, ¼ inch down | ½ inch and less | ¾ inch and less | 1½ inch and less | 2½ inch and less | 3 inch and larger |
|---|---|---|---|---|---|---|
| **EASTERN:** | | | | | | |
| **Buffalo, N. Y.** | | | 1.30 per net ton all sizes | | | |
| **Chaumont, N. Y.** | 1.00 | ..... | 1.75 | 1.50 | 1.50 | 1.50 |
| **Eastern Pennsylvania** | 1.35 | 1.35 | 1.45 | 1.35 | 1.35 | 1.35 |
| **Munns, N. Y.** | 1.00 | 1.40 | 1.40 | 1.30 | 1.30 | ..... |
| **Northern New Jersey** | ..... | ..... | 1.60 | ..... | ..... | ..... |
| **Prospect, N. Y.** | 1.00 | 1.40 | 1.40 | 1.30 | 1.30 | ..... |
| Walford, Penn. | ..... | ..... | 1.35 | 1.50 | 1.60 | 1.60 |
| Watertown, N. Y. | 1.00 | ..... | 1.75 | 1.50 | 1.50 | 1.50 |
| Western New York | .85 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| **CENTRAL** | | | | | | |
| Alton, Ill. | 1.75 | ..... | 1.75 | ..... | ..... | ..... |
| Bloomville, Middlepoint. Dunkirk, Bellevue, Waterville, No. Baltimore, Holland, Kenton, New Paris, Ohio; Monroe, Mich.; Huntington, Bluffton, Ind. | 1.00 | 1.10 | 1.10 | 1.10 | 1.00 | 1.00 |
| Buffalo, Iowa | 1.20 | ..... | 1.45 | 1.25 | 1.30 | 1.30 |
| **Chicago, Ill.** | .80 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Columbia, Krause, Valmeyer, Ill. | 1.15 | 1.20 | 1.20 | 1.20 | 1.10 | 1.10 |
| Cypress, Ill. | 1.20 | 1.20 | 1.15 | 1.20 | 1.25 | 1.25 |
| Dundas, Ont. | .75 | 1.00 | 1.00 | .90 | .90 | .90 |
| Greencastle, Ind. | 1.25 | 1.25 | 1.15 | 1.05 | .95 | .95 |
| Lannon, Wis. | .80 | 1.10 | 1.10 | .90 | .90 | .90 |
| Linwood, Iowa | 1.00 | 1.25 | 1.25 | 1.05 | 1.05 | 1.15 |
| Northern New Jersey | 1.30 | ..... | 1.80 | 1.60 | 1.40 | ..... |
| St. Vincent de Paul, P. Q. | .90 | 1.25@1.45 | 1.00 | .90 | .90 | ..... |
| Stone City, Iowa | .75 | ..... | 1.20† | 1.10 | 1.05 | ..... |
| Waukesha, Wis. | .90 | .90 | .90 | .90 | .90 | .90 |
| Wisconsin Points | .50@1.50 | ..... | 1.10 | 1.00 | 1.00 | ..... |
| **Youngstown, Ohio** | ..... | ..... | ..... | 1.50 | 1.60 | 1.60 |
| **SOUTHERN:** | | | | | | |
| **Alderson, W. Va.** | .60 | 1.60 | 1.60 | 1.50 | 1.40 | ..... |
| Bridgeport and Chico, Texas | 1.00 | 1.25@1.35 | 1.25 | 1.25 | 1.15 | 1.10 |
| Cartersville, Ga. | 1.50 | 1.65 | 1.65 | 1.35 | 1.35 | 1.25 |
| El Paso, Texas | 1.00 | 1.00 | 1.00 | 1.00 | ..... | ..... |
| **Ft. Springs, W. Va.** | .60 | 1.60 | 1.60 | 1.50 | 1.40 | ..... |
| Graysville, Ga. | 1.00 | ..... | .85@1.10 | .85@1.00 | .85@1.00 | ..... |
| **WESTERN:** | | | | | | |
| Atchison, Kans. | .50 | ..... | 2.00 | 2.00 | 2.00 | 1.60‖@1.80 |
| Blue Spr'gs & Wymore, Neb. | .20 | 1.45 | 1.45 | 1.35@1.40 | 1.25@1.30 | 1.20 |
| Cape Girardeau, Mo. | 1.25 | ..... | 1.25 | 1.25 | 1.00 | ..... |
| **Kansas City, Mo.** | 1.00 | 1.65 | 1.65 | 1.65 | 1.65 | 1.65 |

### Crushed Trap Rock

| City or shipping point | Screenings, ¼ inch down | ½ inch and less | ¾ inch and less | 1½ inch and less | 2½ inch and less | 3 inch and larger |
|---|---|---|---|---|---|---|
| Branford, Conn. | .60 | 1.70 | 1.45 | 1.20 | 1.05 | ..... |
| Duluth, Minn. | 1.00 | 2.25 | 1.75 | 1.50 | 1.30 | 1.30 |
| **Dwight, Calif.** | 1.75 | 1.75 | 1.75 | 1.75 | 1.75 | ..... |
| **Eastern Maryland** | 1.10 | 1.75 | 1.70 | 1.60 | 1.50 | 1.50 |
| **Eastern Massachusetts** | .85 | 1.75 | 1.75 | 1.25 | 1.25 | 1.25 |
| **Eastern New York** | .75 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| **Eastern Pennsylvania** | 1.10 | 1.75 | 1.70 | 1.60 | 1.50 | 1.50 |
| **Minneapolis, Minn.** | 1.25 | ..... | 2.25 | 2.00 | 1.75 | ..... |
| Northern New Jersey | 1.70 | 2.20 | 2.00 | 1.60 | 1.60 | ..... |
| Oakland and El Cerrito, Calif. | 1.75 | 1.75 | 1.75 | 1.75 | 1.75 | ..... |
| **San Diego, Calif.** | .50@.75 | 1.80@1.90 | 1.60@1.80 | 1.35@1.55 | 1.35@1.55 | 1.25@1.45 |
| Springfield, N. J. | 2.00 | 2.10 | 2.20 | 1.80 | ..... | ..... |
| Westfield, Mass. | .60 | 1.50 | 1.35 | 1.20 | 1.10 | 1.10 |

### Miscellaneous Crushed Stone

| City or shipping point | Screenings, ¼ inch down | ½ inch and less | ¾ inch and less | 1½ inch and less | 2½ inch and less | 3 inch and larger |
|---|---|---|---|---|---|---|
| **Berlin, Utley and Red Granite, Wis.** | 1.60 | 1.70 | 1.60 | 1.50 | 1.40 | ..... |
| Columbia, S. C.—Granite | 1.50b | 2.00 | 2.00 | 1.75 | 1.75 | ..... |
| Eastern Penn.—Sandstone | 1.25 | 1.65 | 1.60 | 1.40 | 1.40 | 1.25 |
| Eastern Penn.—Quartzite | 1.20 | 1.35 | 1.20 | 1.20 | 1.20 | 1.20 |
| Lithonia, Ga.—Granite | .75(c) | 2.00 | 1.75 | 1.25 | 1.25 | ..... |
| Lohrville, Wis. | 1.65 | 1.65@1.70 | ..... | 1.45 | 1.50 | ..... |
| Middlebrook, Mo.—Granite | 3.00@3.50 | ..... | 2.00@2.25 | 2.00@2.25 | ..... | 1.25@2.00 |
| **Northern New Jersey (Basalt)** | 150 | 2.00 | 1.80 | 1.40 | 1.40 | ..... |
| **Richmond, Calif. (Basalt)** | .75* | ..... | 1.50* | 1.50* | 1.50* | ..... |

*Cubic yd. †1 in. and less. ‖Rip rap per ton; (b) dust out; (c) sand.

## Agricultural Limestone

### (Pulverized)

Alton, Ill. — Analysis, 98% $CaCO_3$; 90% thru 100 mesh ..... 6.00

Asheville, N. C. — Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk ..... 2.75

Branchton, Penn. — 100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers) ..... 5.00

Cartersville, Ga. — Analysis, 58% $CaCO_3$, 38% $MgCO_3$; pulverized ..... 2.25
50% thru 50 mesh ..... 1.50

Chaumont, N. Y. — Pulverized limestone, bags, 4.00; bulk ..... 2.50

Colton, Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk ..... 4.00

Dundas, Ont., Can.—Analysis, 53.80% $CaCO_3$, 43.31% $MgCO_3$; 35% thru 100 mesh, 50% thru 50 mesh, 100% thru 10 mesh; bags, 4.75; bulk ..... 3.00

Hillsville, Penn. — Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; sacks, $5.00; bulk ..... 3.50

Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk ..... 2.50

Knoxville, Tenn.—80% thru 100 mesh, bags, 3.95; bulk ..... 2.70

Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk ..... 2.75

Marblehead, Ohio — Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.10; bulk ..... 3.60

Marion, Va. — Analysis, 90% $CaCO_3$, 2% $MgCO_3$; 42.5% thru 100 mesh, 11.3% thru 80, 20.2% thru 60, 22.8% thru 40, 3.2% thru 20 and under or 75% thru 40 mesh; pulverized, per ton ..... 2.00

Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 90% thru 100 mesh ..... 4.00

Mountville, Va.—Analysis 76.60% $CaCO_3$, 22.83% $MgCO_3$; 50% thru 100 mesh, 100% thru 20 mesh—125-lb. hemp bags ..... 5.00

Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers) ..... 5.00

Piqua, Ohio—Total neutralizing power 95.3%; 100% thru 10, 60% thru 50; 50% thru 100 ..... 2.10@2.25
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.00; bulk ..... 3.50
100% thru 100, 85% thru 200; bags, 7.00; bulk ..... 5.50

Rockdale, Mass. — Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk ..... 3.25

Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; bags, 4.00; bulk ..... 2.50

West Stockbridge, Mass. — Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk ..... 3.25

## Agricultural Limestone

### (Crushed)

Alderson, W. Va. — Analysis, 90% $CaCO_3$; 50% thru 100 mesh ..... 1.50

Alton, Ill.—Analysis 98% $CACO_3$; 50% thru 4 mesh ..... 3.50

Bedford, Ind.—Analysis, 98½% $CaCO_3$, ½% $MgCO_3$; 90% thru 10 mesh ..... 1.50

Bettendorf, Iowa — 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh ..... 1.50

Blackwater, Mo.—77% $CaCO_3$; 100% thru 8 mesh, 25% thru 100 mesh ..... 1.00

Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh ..... 1.75
50% thru 4 mesh ..... 1.50

Cape Girardeau, Mo.—Analysis, 93.5% $CaCO_3$, 3.5% $MgCO_3$; 50% thru 100 mesh ..... 1.50

(Continued on next page)

## Agricultural Limestone

(Continued from preceding page)

Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh ..... .80
Columbia, Krause, Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 90% thru 4 mesh ..... 1.15
Cypress, Ill.—50% thru 100 mesh..... 1.25
90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh ..... 1.15
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh..... 1.50
Kansas City, Mo.—50% thru 100 mesh ..... 1.25
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh..... 2.00
Screenings (¼ in. to dust)..... 1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk ..... 1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 90% thru 50 mesh..... 1.85
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind.—Analysis, 52% $CaCO_3$, 44% $MgCO_3$; meal, 100% thru 4 mesh, 35% thru 100 mesh.... .75@ 1.50
Milltown, Ind.—Analysis, 94.41% $CACO_3$, 2.95% $MgCO_3$; 30.8% thru 100 mesh .38% thru 50 mesh.... 1.45@ 1.60
Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$—50% thru 100 mesh; 50% thru 4 mesh ..... 1.50
Pixley, Mo.—Analysis, 96% $CACO_3$; 50% thru 50 mesh..... 1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh..... 1.65
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk..... .80@ 1.40
Stone City, Iowa.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh..... .75
Waukesha, Wis.—Test, 107.38% bone dry, 100% thru 10 mesh; bags, 2.85; bulk ..... 2.10

## Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk..... 3.00
Waukesha, Wis.—Bulk ..... 3.50

## Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton.

**Glass Sand:**

Berkeley Springs, W. Va..... 2.00@ 2.50
Cedarville and S. Vineland, N. J.—
Damp ..... 1.75
Dry ..... 2.25
Cheshire, Mass:
6.00 to 7.00 per ton; bbl..... 2.50
Columbus, Ohio ..... 1.25@ 1.50
Estill Springs and Sewanee, Tenn..... 1.50
Grays Summit and Klondike, Mo..... 2.00
Los Angeles, Calif.—Washed..... 5.00
Mapleton Depot, Penn..... 2.00@ 2.25
Massillon, Ohio ..... 3.00
Ohlton, Ohio ..... 2.50
Ottawa, Ill.—Chemical and mesh guaranteed ..... 1.50
At market ..... 1.00
Pacific, Mo. ..... 2.25@ 3.00
Pittsburgh, Penn.—Dry ..... 4.00
Damp ..... 3.00
Red Wing, Minn.:
Bank run ..... 1.50
Ridgway, Penn. ..... 2.50
Rockwood, Mich. ..... 2.75@ 3.25
Round Top, Md..... 2.25
San Francisco, Calif. ..... 3.00@ 3.50
St. Louis, Mo..... 1.50@ 3.00
Sewanee, Tenn. ..... 1.50
Thayers, Penn. ..... 2.50
Utica, Ill. ..... 1.00@ 1.25
Zanesville, Ohio ..... 2.50

**Miscellaneous Sands:**

Aetna, Ind.:
Core, Box cars, net, .35; open-top cars ..... .30
Albany, N. Y.:
Molding fine, brass molding..... 3.00
Molding coarse ..... 2.75
Sand blast ..... 4.50
Arenzville and Tamalco, Ill.:
Core ..... 1.00
Molding coarse ..... 1.50
Molding fine ..... 1.50@ 1.75
Brass molding ..... 2.00
Beach City, Ohio:
Fine core, washed and screened..... 1.50
Furnace bottom; steel molding (fine

(Continued on next page)

# Wholesale Prices of Sand and Gravel

**Prices given are per ton, f. o. b. producing plant or nearest shipping point**

## Washed Sand and Gravel

| City or shipping point | Fine Sand, 1/10 in. down | Sand, ¼ in. and less | Gravel, ½ in. and less | Gravel, 1 in. and less | Gravel, 1½ in. and less | Gravel, 2 in. and less |
|---|---|---|---|---|---|---|
| **EASTERN:** | | | | | | |
| Ambridge & So. H'g'ts, Penn. | 1.25 | 1.25 | 1.15 | .85 | .85 | .85 |
| Buffalo, N. Y. | 1.10 | .95 | | | .85 | |
| Farmingdale, N. J. | .83 | .73 | 1.20 | 1.20 | 1.35 | |
| Leeds Jct., Maine | | .50 | 1.75 | | 1.35 | 1.25 |
| Machias Jct., N. Y. | | .75 | .75 | .75 | .75 | .75 |
| Montoursville, Penn. | 1.00 | 1.10 | 1.00 | 1.00 | .90 | .90 |
| Northern New Jersey | .40@ .50 | .40@ .50 | | 1.25 | 1.25 | 1.25 |
| Pittsburgh, Penn., and vicinity | 1.25 | 1.25 | 1.05 | 1.05 | .85 | .85 |
| Shining Point, Penn. | | | 1.00 | 1.00 | 1.00 | 1.00 |
| Washington, D. C.—Rewashed, river | .85 | .85 | 1.70 | 1.50 | 1.30 | 1.30 |
| **CENTRAL:** | | | | | | |
| Attica, Ind. | .75 | .75 | .75 | .75 | .75 | .75 |
| Columbus, Ohio | .75 | .75@1.00 | .75@1.00 | .75@1.00 | .75@1.00 | .75 |
| Covington, Ind. | .75 | .75 | .75 | .75 | .75 | .75 |
| Des Moines, Iowa | .50 | .30 | 1.50 | 1.50 | 1.50 | 1.50 |
| Eau Claire, Wis. | .60@1.00 | .40@ .50 | .85@1.25 | | | .85@ .95 |
| Elkhart Lake, Wis. | .60 | .60 | .80 | .80 | .80 | .80 |
| Ft. Dodge, Iowa | 1.00 | | 2.05 | 2.05 | 2.05 | |
| Ft. Worth, Texas | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Grand Rapids, Mich. | | .50 | | .80 | .70 | .70 |
| Hamilton, Ohio | | 1.00 | | | 1.00 | |
| Hersey, Mich. | | .50 | | | | .70 |
| Indianapolis, Ind.* | .60 | .60 | | .90 | .75@1.00 | .75@1.00 |
| Janesville, Wis. | | .65@ .75 | | | .65@ .75 | |
| Mason City, Iowa | .45@ .55 | .45@ .55 | 1.35@1.45 | 1.45@1.55 | 1.40@1.50 | 1.35@1.45 |
| Mankato, Minn. | | .50 | 1.25 | | 1.25 | |
| Milwaukee, Wis. | 1.01 | 1.01 | 1.21 | 1.21 | 1.21 | 1.21 |
| Minneapolis, Minn.* | .65 | 2.50† | 2.00§ | | 2.00 | 1.75 |
| Northern New Jersey | .45@ .50 | .45@ .50 | | 1.25 | 1.25 | |
| Palestine, Ill. | .75 | .75 | .75 | .75 | .75 | .75 |
| St. Louis, Mo., f. o. b. cars | 1.18 | 1.45 | 1.65§ | 1.45 | | 1.45§ |
| Silverwood, Ind. | .75 | .75 | .75 | .75 | .75 | .75 |
| Summit Grove, Ind. | .75 | .75 | .75 | .75 | .75 | .75 |
| Terre Haute, Ind. | .75 | .60 | .90 | .90 | .90 | .85 |
| Wolcottville, Ind. | .75 | .75 | .75 | .75 | .75 | .75 |
| Waukesha, Wis. | .40 | .40 | .65 | .65 | .65 | .65 |
| Winona, Minn. | .40 | .40 | 1.25 | 1.10 | 1.00 | 1.00 |
| Yorkville, Sheridan, Oregon, Moronts, Ill. | | | Average .40@.60 | | | |
| Zanesville, Ohio | | .60 | .60 | .60 | .90 | |
| **SOUTHERN:** | | | | | | |
| Brookhaven, Miss., Roseland La. | 1.75* | .70 | 2.25 | 1.50 | 1.25 | |
| Charleston, W. Va. | All sand 1.40 f.o.b. cars. | | | All gravel 1.50 f.o.b. cars. | | |
| Chehaw, Ala. | 1.24 | 1.24 | | 1.90 | 1.90 | 1.90 |
| Estill Sp'gs & Sewanee, Tenn. | 1.00 | .90 | 1.00 | 1.00 | | .85 |
| Knoxville, Tenn. | 1.00 | 1.20 | 1.20 | 1.20 | 1.20 | 1.20 |
| Macon, Ga. | .50 | .50 | | .55 | .60 | |
| New Martinsville, W. Va. | 1.00 | .90 | | 1.30 | | .90 |
| Smithville, Texas | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| **WESTERN:** | | | | | | |
| Baldwin Park, Calif. | | .25@ .35 | | | .50@ .75 | |
| Crushed rock | .90@1.10 | .60@ .90 | .60@ .90 | .60@ .90 | .60@ .90 | |
| Kansas City, Mo. | | Kaw river sand .75 per ton f.o.b. plants | | | | |
| Los Angeles, Calif. | | .40 | .50 | .65 | .60 | .60 |
| Pueblo, Colo. | 1.10* | .90* | | 1.60* | | 1.50* |
| San Diego, Calif. | .50 | .50 | 1.20 | 1.20 | 1.00 | 1.00 |
| Seattle, Wash. (bunkers) | 1.50* | 1.50* | 1.50* | 1.50* | 1.50* | 1.50* |

## Bank Run Sand and Gravel

| City or shipping point | Fine Sand, 1/10 in. down | Sand, ¼ in. and less | Gravel ½ in. and less | Gravel, 1 in. and less | Gravel, 1½ in. and less | Gravel, 2 in. and less |
|---|---|---|---|---|---|---|
| Boonville, N. Y. | .60@ .80 | | .55@ .75 | | | 1.00 |
| Brookhaven, Miss., Rosel'd, La. | Road gravel, ballast gravel .60 a ton | | | | | |
| Chehaw, Ala. | .90@1.00 | | | | | |
| Des Moines, Iowa | Washed, .50; unwashed, .40 (not screened) | | | | | |
| Dudley, Ky.‡ | 1.05 | 1.05 | | .95 | | |
| East Hartford, Conn. | Sand, .65 per cu. yd. | | | | | |
| Elkhart Lake, Wis. | .50 | | | | | |
| Gainesville, Texas | | .95 | | | | .55 |
| Grand Rapids, Mich. | | | | .55 | | |
| Hamilton, Ohio | | | | | .67 | |
| Hersey, Mich. | | | | .55 | | |
| Indianapolis, Ind. | Mixed gravel for concrete work, .65 | | | | | |
| Lindsay, Texas | | | | | | .55 |
| Macon, Ga. | .35 | | | | | |
| Mankato, Minn. | Pit run gravel, .60 | | | | | |
| Moline, Ill. (b) | .60 | .60 | Concrete gravel, 50% G., 50% S., 1.00 | | | |
| Montezuma, Ind. | | | | | | .60 |
| St. Louis, Mo. | Mine run gravel 1.55 per ton | | | | | |
| Shining Point, Penn. | Concrete sand, 1.10 ton | | | | | |
| Smithville, Texas | .50 | .50 | .50 | .50 | .50 | .50 |
| Summit Grove, Ind. | .50 | .50 | .50 | .50 | .50 | .50 |
| Waukesha, Wis. | .60 | .60 | .60 | .60 | .60 | .60 |
| Winona, Minn. | .60 | .60 | .60 | .60 | .60 | .60 |
| York, Penn. | 1.10 | 1.00 | | | | |
| Zanesville, Ohio | | .60 | | | | |

*Cubic yd.; †roofing gravel; §⅝ in. and less; ‡crushed silica; ‖2½ in. and less; (a) ¾ in. and less; (b) river run.

## Miscellaneous Sands

(Continued from preceding page)

| | |
|---|---|
| and coarse) washed and screened | 2.00 |
| Traction | 1.75 |
| **Cheshire, Mass.—Furnace lining, molding fine and coarse** | 5.00 |
| **Sand blast** | 5.00@ 8.00 |
| **Stone sawing** | 6.00 |
| **Columbus, Ohio:** | |
| Core | .30@ .50 |
| Furnace lining, molding coarse | 2.00@ 2.25 |
| Molding fine | 2.50@ 2.75 |
| Sand blast | 4.00@ 4.50 |
| Stone sawing | 1.50 |
| Traction | .50@ .75 |
| Brass molding | 2.50@ 3.00 |
| **Dresden, Ohio:** | |
| Core | 1.25@ 1.50 |
| Molding fine | 1.50@ 1.75 |
| Molding coarse | 1.50 |
| Traction | 1.25 |
| Brass molding | 1.75 |
| **Dunbar, Penn.:** | |
| Traction (damp) | 2.00 |
| **Eau Claire, Wis.:** | |
| Sand blast | 3.00@ 3.25 |
| **Elco, Ill.:** | |
| **Ground silica per ton in carloads** | 20.00@31.00 |
| **Estill Springs and Sewanee, Tenn:** | |
| Molding fine and coarse, brass molding | 1.25 |
| Roofing sand, sand blast, traction | 1.50 |
| **Franklin, Penn.:** | |
| Core | 2.00 |
| Molding coarse and fine | 1.75 |
| **Grays Summit, Mo.:** | |
| Molding fine | 1.75@ 2.00 |
| **Joliet, Ill.:** | |
| No. 2 molding sand; also loam for luting purposes and open-hearth work | .65@ .85 |
| **Klondike, Mo.:** | |
| Molding fine | 1.75@ 2.00 |
| **Mapleton Depot, Penn.:** | |
| Molding fine, traction | 2.00 |
| **Massillon, Ohio:** | |
| Molding fine, coarse, furnace lining core and traction | 2.50 |
| **Montoursville, Penn.:** | |
| Core | 1.25@ 1.35 |
| Traction | 1.00@1.10 |
| Brass molding | 1.50 |
| **New Lexington, Ohio:** | |
| Molding fine | 2.75 |
| Molding coarse | 2.25 |
| **Ohlton, Ohio:** | |
| Core, furnace lining, molding fine and coarse, all green | 1.75@ 1.90 |
| Roofing sand, sand blast, stone sawing, traction, all green | 1.75 |
| Add 50c a ton for green sand dried. | |
| **Oceanside, Calif.:** | |
| **Roofing sand (stucco)** | 3.00@ 3.40 |
| **Ottawa, Ill.:** | |
| Crude silica sand | 1.00@ 1.25 |
| Core, furnace lining | 1.25 |
| Roofing sand, brass molding | 1.25@ 2.50 |
| Sand blast, stone sawing | 4.00 |
| Traction | 1.00 |
| **Pacific, Mo.:** | |
| **Core, furnace lining** | 1.00@ 1.25 |
| **Molding fine** | .90@ 1.00 |
| **Stone sawing** | 1.00@ 1.75 |
| **Molding coarse** | .85@ 1.00 |
| **Red Wing, Minn.:** | |
| Core, furnace lining, stone sawing | 1.50 |
| Molding fine and coarse, traction | 1.25 |
| Sand blast | 3.50 |
| Filter sand | 3.75 |
| **Ridgway, Penn.:** | |
| Core | 2.00 |
| Furnace lining, molding fine, molding coarse | 1.25 |
| Traction | 2.25 |
| **Round Top, Md.:** | |
| Core | 1.60 |
| Traction, damp | 1.75 |
| Roofing sand | 2.25 |
| **St. Louis, Mo.:** | |
| Core | 1.00@ 1.75 |
| Furnace lining | 1.50 |
| Molding fine | 1.50@ 2.50 |

## Crushed Slag

| City or shipping point | Roofing | ¼ in. down | ⅜ in. and less | ¾ in. and less | 1½ in. and less | 2½ in. and less | 3 in. and larger |
|---|---|---|---|---|---|---|---|
| **EASTERN:** | | | | | | | |
| Buffalo, N. Y. | 2.35 | 1.35 | 1.35 | 1.35 | 1.35 | 1.35 | 1.35 |
| E. Canaan, Conn. | 3.00 | 1.00 | 2.25 | 1.25 | 1.25 | 1.15 | 1.15 |
| Eastern Penn. and Northern N. J. | 2.50 | 1.20 | 1.50 | 1.20 | 1.20 | 1.20 | 1.20 |
| Reading, Pa. | 2.50 | 1.00 | 2.50* | 1.25 | | | |
| Western Penn. | 2.50 | 1.25 | 1.50 | 1.25 | 1.25 | 1.25 | 1.25 |
| **CENTRAL:** | | | | | | | |
| Ironton, Ohio | 2.05 | 1.45 | | 1.45 | | 1.45 | |
| Jackson, Ohio | | 1.05 | | 1.30 | 1.05 | 1.30 | |
| Youngst'n, O., dist. | 2.00 | 1.25 | 1.35 | 1.35 | 1.25 | 1.25 | 1.25 |
| **SOUTHERN:** | | | | | | | |
| Ashland, Ky. | | 1.55 | | 1.55 | 1.55 | 1.55 | |
| Ensley and Alabama City, Ala. | 2.05 | .80 | 1.25 | 1.15 | .90 | .90 | .80 |
| Longdale, Goshen, Glen Wilton, Roanoke, Ruesens, Va. | 2.50 | 1.00 | 1.25 | 1.25 | 1.25 | 1.15 | 1.15 |

*Clean.

## Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

| | Finishing hydrate | Masons' hydrate | Agricultural hydrate | Chemical hydrate | Ground burnt lime, Blk. | Ground burnt lime, Bags | Lump lime, Blk. | Lump lime, Bbl. |
|---|---|---|---|---|---|---|---|---|
| **EASTERN:** | | | | | | | | |
| Berkeley, R. I. | | | 12.00 | | | | | 2.20 |
| Buffalo, N. Y. | | | | 12.00 | | | | |
| Lime Ridge, Penn. | | | | | | | 5.00a | |
| Williamsport, Penn. | | | 10.00 | | | | 6.00 | |
| York, Penn. | | 11.50 | 10.50 | 11.50 | | | 8.00 | 1.65i |
| **CENTRAL:** | | | | | | | | |
| Cold Springs, Ohio | | 9.00 | 9.00 | | 9.00 | 11.00 | | |
| Delaware, Ohio | 12.50 | 10.00 | 9.00 | | | | 9.00 | 1.50 |
| Gibsonburg, Ohio | 12.50 | | | | 9.00 | | | |
| Huntington, Ind. | 12.50 | 10.00 | 9.00 | | | | 9.00 | |
| **Luckey, Ohio (f)** | 12.50 | | | | | | | |
| Marblehead, Ohio | | 10.00 | 12.00 | | | | 9.00 | 1.50j |
| Marion, Ohio | | 10.00 | 9.00 | | | | 9.00 | 1.50j |
| **Mitchell, Ind.** | | 12.00 | 12.00 | 12.00 | 11.00 | | 10.00 | 1.70e |
| Tiffin, Ohio | | 10.00 | | | | | | |
| White Rock, Ohio | 12.50 | | | | 9.00 | 11.00 | 9.00 | |
| Woodville, Ohio | 12.50† | 9.00† | 8.50† | | 9.00 | 10.50 | 8.00 | 1.60 |
| **SOUTHERN:** | | | | | | | | |
| Erin, Tenn. | | | | | | | 7.80 | 1.25 |
| El Paso, Texas | | | | | | | 9.00 | |
| Graystone & Wilmag, Ala. | 12.50 | 11.00 | | 11.00 | | | 8.50 | 1.50 |
| Karo, Va. | | 10.50 | 9.00 | | | | 7.00g | 1.65h |
| Knoxville, Tenn. | 12.50 | 11.00 | | 11.00 | | 1.35 | 8.50 | 1.50 |
| Varnons, Ala. (f) | 10.00p | 10.00p | | 10.00p | | | 7.75q | 1.40r |
| Zuber and Ocala, Fla. | 14.00 | 12.00 | 10.00 | | | | 12.00 | 1.70 |
| **WESTERN:** | | | | | | | | |
| Kirtland, N. M. | | | | | | | 15.00 | |
| San Francisco, Calif. | 22.00 | 22.00 | 15.00 | 22.00 | | | 2.00n | 2.50o |
| **Tehachapi, Calif.** | | | | | | | 13.00 | 2.00d |

†50-lb. paper bags; (a) run of kilns; (c) wooden, steel 1.70; (d) wood; (e) wood bbl., $2.20 drum in steel; (f) dealers' prices; (g) to 9.50; (h) to 1.75; (i) 200 lb. bbl.; 2.65, 300 lb. bbl.; (j) wood, steel, 1.70; (l) bags; (m) finishing lime, 2.50 common; (n) common lime; (o) high calcium; (p) to 11.00; (q) to 8.50; (r) to 1.50.

## Miscellaneous Sands

(Continued)

| | |
|---|---|
| **Molding coarse** | 1.25@ 1.75 |
| **Roofing sand** | 1.75 |
| **Sand blast** | 3.50@ 4.50 |
| **Stone sawing** | 1.25@ 2.25 |
| **Traction** | 1.25 |
| **Brass molding** | 2.00@ 3.00 |
| **San Francisco, Calif.:** | |
| (Washed and dried)—Core, molding fine, roofing sand and brass molding | 3.00@ 3.50 |
| **San Francisco, Calif. (Direct from Pit)** | |
| **Furnace lining, molding coarse, sand blast** | 3.60 |
| **Stone sawing, traction** | 2.30 |
| **Sewanee, Tenn.:** | |
| Molding fine and coarse, roofing sand, sand blast, stone sawing, traction, brass molding | 1.25 |
| **Tamms, Ill.:** | |
| **Ground silica per ton in carloads** | 20.00@31.00 |
| **Thayers, Penn.:** | |
| **Core** | 2.00 |
| **Molding fine and coarse** | 1.25 |
| **Traction** | 2.25 |
| **Utica, Ill.:** | |
| Furnace lining | 1.25 |
| Molding fine | .75 |
| Molding coarse | .85 |
| **Utica, Penn.:** | |
| Core, molding fine, brass molding | 2.00 |
| **Molding coarse** | 1.50@ 1.75 |
| **Warwick, Ohio.:** | |
| Core, molding coarse (green) 2.00; (dry) 2.50; traction | 2.50 |
| **Zanesville, Ohio:** | |
| Sand blast, core, traction | 2.50 |
| **Furnace lining** | 2.25 |
| Molding fine and coarse; brass molding | 1.50@ 1.75 |

## Talc

**Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.**

| | |
|---|---|
| **Baltimore, Md.:** | |
| Crude talc (mine run) | 3.00@ 4.00 |
| Ground talc (20-50 mesh), bags | 10.00 |
| Cubes | 55.00 |
| Blanks (per lb.) | .08 |
| Pencils and steel workers' crayons, per gross | 1.25 |
| **Chatsworth, Ga.:** | |
| Crude (for grinding) | 6.00 |
| Ground (150-200 mesh) 200 lb. bags | 10.00 |
| Pencils and steel workers crayons | 1.25@ 2.00 |
| **Chester, Vt.:** | |
| **Ground (20-70 mesh)** | 7.00@ 8.00 |
| Ground (150-200 mesh) | 8.00@10.00 |
| (Bags extra, returnable) | |
| **E. Granville, Rochester, Johnson, Waterbury, Vt.:** | |
| **Ground talc (20-50 mesh) bags** | 7.00@10.00 |
| **Ground talc (150-200 mesh) bags** | 10.00@25.00 |
| **Pencils and steel workers' crayons, per gross** | .75@ 2.00 |
| **Emeryville, N. Y.:** | |
| (Double air floated) including bags; 325 mesh (50 lb. paper, 100 & 200 lb. burlap bags) | 14.75 |
| **Hailesboro, N. Y.:** | |
| Ground (150-200 mesh) bags | 18.00 |
| **Henry, Va.:** | |
| Crude talc (mine run) per 2000-lb. ton | 2.75@ 3.50 |
| Ground (150-200 mesh), bags | 9.00@14.00 |
| **Joliet, Ill.** | |
| Ground (200 mesh), bags | 30.00 |
| **Marshall, N. C.:** | |
| Crude | 4.00@ 8.00 |
| Ground (20-50 mesh), bags extra | 6.50@ 8.50 |
| Ground (150-200 mesh), bags | 8.00@12.00 |
| **Natural Bridge, N. Y.:** | |
| Ground talc (300-325 mesh), 200-lb. bags | 13.50 |
| 50-lb. bags | 14.00 |

## Rock Phosphate

**Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.**

### Lump Rock

| | |
|---|---|
| **Gordonsburg, Tenn.—B.P.L. 68-72%** | 4.00@ 4.50 |
| **Mt. Pleasant, Tenn.—B.P.L. 72%** | 5.50@ 6.00 |
| 13% phosphoric acid, 95% thru 100 mesh | 5.50@ 6.00 |
| 75% hand mined | 6.50 |
| 75% (free of fines for furnace use) | 6.75 |
| **75% max. 5½% I and A** | 6.50@ 7.00 |
| **78% max. 4½% I and A** | 8.00 |
| 75/78 B.P.L. | 6.50@ 8.50 |
| **Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L.** | 5.50 |
| **Twomey, Tenn.—B.P.L. 65%, 2000 lb.** | 7.00@ 8.00 |

### Ground Rock

(2000 lb.)

| | |
|---|---|
| Centerville, Tenn.—B.P.L. 65% | 7.00 |
| Gordonsburg, Tenn.—B.P.L. 68-72% | 4.50@ 5.00 |
| Mt. Pleasant, Tenn. — B.P.L. 65% 95% thru 100 mesh | 6.50@ 7.00 |
| **Twomey, Tenn.—B.P.L. 65%** | 7.00@ 8.00 |

(Continued on next page)

## Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Clay Roofing Slate, f. o. b. cars quarries:

| Sizes | Genuine Bangor, Washington Big Bed, Franklin Big Bed | Genuine Albion | Slatington Small Bed | Genuine Bangor Ribbon |
|---|---|---|---|---|
| 24x12, 24x14 | 10.20 | 10.00 | 8.10 | 7.80 |
| 22x12 | 10.80 | 10.00 | 8.40 | 8.75 |
| 22x11 | 10.80 | 10.50 | 8.40 | 8.75 |
| 20x12 | 12.60 | 10.50 | 8.70 | 8.75 |
| 20x10, 18x10, 18x9, 18x12 | 12.60 | 11.00 | 8.70 | 8.75 |
| 16x10, 16x9, 16x8, 16x12 | 12.60 | 11.00 | 8.40 | 8.75 |
| 14x10 | 11.10 | 11.00 | 8.10 | 7.80 |
| 14x8 | 11.10 | 10.50 | 8.10 | 7.80 |
| 14x7 to 12x6 | 9.30 | 10.50 | 7.50 | 7.80 |
| | Mediums | Mediums | Mediums | Mediums |
| 24x12 | $ 8.10 | $8.10 | $7.20 | $5.75 |
| 22x11 | 8.40 | 8.40 | 7.50 | 5.75 |
| Other sizes | 8.70 | 8.70 | 7.80 | 5.75 |

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

## Florida Soft Phosphate

### (Raw Land Pebble)

Per Ton

| | |
|---|---|
| Florida—F. O. B. mines, gross ton, 68/66% B.P.L., Basis 68% | 2.25 |
| 70% min. B.P.L., Basis 70% | 2.50 |
| 72% min. B.P.L., Basis 72% | 2.75 |
| 75/74% B.P.L., Basis 75% | 3.75 |

## Fluorspar

| | |
|---|---|
| Fluorspar—80% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines | 17.50 |
| Fluorspar—85% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines | 18.00 |
| Fluorspar, foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Philadelphia, duty paid, per gross ton | 19.75 |

## Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

| City or shipping point | Terrazzo | Stucco chips |
|---|---|---|
| Barton, Wis., f.o.b. cars | | 10.50 |
| Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries | | 17.50 |
| Crown Point, N. Y.—Mica Spar | | 7.00@ 8.00 |
| Easton, Penn. — Light and dark granite | 20.00 | *18.00 |
| Haddam, Conn. — Felstone buff | 12.00 | 12.00 |
| Harrisonburg, Va.—Blk marble (crushed, in bags | 12.50 | 12.50 |
| Ingomar, Ohio (in bags) | | 6.00@20.00 |
| Middlebrook, Mo.—Red | | 20.00@25.00 |
| Milwaukee, Wis. | | 14.00@34.00 |
| Newark, N. J.—Roofing granules | | 7.50 |
| New York, N. Y.—Red and yellow Verona | | 32.00 |
| Poultney, Vt., 2000 lb. | | 6.12 |
| Red Granite, Wis. | | 7.50 |
| Sioux Falls, S. D. | 7.50 | 7.50 |
| Stockton, Cal. — Sized rock for roofing and stucco dashes, CL lots | | 12.00 |
| Tuckahoe, N. Y.—2000 lb. | | 12.00 |
| Wauwatosa, Wis. | | 20.00@34.00 |

*In bags; bulk $16.00.

## Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

| | Common | Face |
|---|---|---|
| Appleton, Minn. | 22.00 | 25.00@35.00 |
| Baltimore, Md. (Del. according to quantity) | 16.00@17.00 | 22.00@50.00 |
| Ensley, Ala. ("Slagtex") | 12.50 | 22.50@33.50 |
| Eugene, Ore. | 25.00 | 35.00@75.00 |
| Friesland, Wis. | 22.00 | 32.00 |
| Milwaukee, Wis. | 14.00 | 30.00@42.00 |
| Omaha, Neb. | 18.00 | 30.00@40.00 |
| Philadelphia, Penn. | 15.00 | 20.00 |
| Portland, Ore. | 19.00 | 25.00@75.00 |
| Prairie du Chien, Wis. | 14.00 | 22.00@30.00 |
| Puyallup, Wash. | 20.00 | 30.00@90.00 |
| Rapid City, S. D. | 18.00 | 25.00@45.00 |
| Salem, Ore. | 23.00 | 90.00@100.00 |
| Watertown, N. Y. | 20.00 | 35.00 |
| Wauwatosa, Wis. | 14.00@18.00 | 30.00@42.00 |

## Sand-Lime Brick

Prices given per 1000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

| | |
|---|---|
| Barton, Wis. | 10.50 |
| Boston, Mass. | 14.00@15.50 |
| Dayton, Ohio | 12.50@13.50 |
| Grand Rapids, Mich. (wholesale) | 10.00 |
| Jackson, Mich. | 13.00 |
| Lancaster, N. Y. | 13.00 |
| Michigan City, Ind. | 11.00 |
| Milwaukee, Wis. | 13.00 |
| Plant City, Fla. | 12.00@16.00 |
| Portage, Wis. | 15.00 |
| Rochester, N. Y. (delivered) | 19.75 |
| Saginaw, Mich. | 13.00 |
| San Antonio, Texas | 12.50@14.00 |
| Syracuse, N. Y. | 15.00@17.00 |

## Gray Klinker Brick

| | |
|---|---|
| El Paso, Texas | 13.00 |

## Lime

Warehouse prices, carload lots at principal cities.

| | Hydrated, per ton Finishing | Common |
|---|---|---|
| Atlanta, Ga. | 22.50 | 14.00 |
| Baltimore, Md. | 24.25 | 17.85 |
| Boston, Mass. | 20.50 | 15.50 |
| Cincinnati, Ohio | 16.80 | 14.30 |
| Chicago, Ill. | 20.00 | 18.00 |
| Dallas, Tex. | 20.00 | —— |
| Denver, Colo. | 24.00 | —— |
| Detroit, Mich. | 22.00 | 20.00 |
| Minneapolis, Minn. (white) | 25.50 | 21.00 |
| Montreal, Que. | —— | 21.00 |
| New York, N. Y. | 18.20 | 13.10 |
| Philadelphia, Penn. | 23.00 | 16.00 |
| St. Louis, Mo. | 24.00 | 20.00 |
| San Francisco, Calif. | 22.60 | —— |
| Seattle, Wash. (paper sacks) | 24.00 | —— |

## Portland Cement

Prices per bag and per bbl. without bags net in carload lots.

| | Per Bag | Per Bbl. |
|---|---|---|
| Albany, N. Y. | —— | 2.62 |
| Atlanta, Ga. | —— | 2.35 |
| Boston, Mass. | —— | 2.63@2.93† |
| Buffalo, N. Y. | —— | 2.48@2.88† |
| Cedar Rapids, Iowa | —— | 2.44 |
| Cincinnati, Ohio | —— | 2.47 |
| Cleveland, Ohio | —— | 2.39 |
| Chicago, Ill. | —— | 2.20 |
| Columbus, Ohio | —— | 2.42 |
| Dallas, Texas | .52½ | 2.10 |
| Davenport, Iowa | —— | 2.39 |
| Dayton, Ohio | —— | 2.38 |
| Denver, Colo. | .63¾ | 2.55 |
| Detroit, Mich. | —— | 2.40 |
| Duluth, Minn. | —— | 2.19 |
| Indianapolis, Ind. | —— | 2.41 |
| Kansas City, Mo. | .51¾ | 1.97 |
| Los Angeles, Cal. (less 5c dis.) | .65 | 2.60 |
| Memphis, Tenn. | —— | 2.60 |
| Milwaukee, Wis. | —— | 2.35 |
| Minneapolis, Minn. | —— | 2.42 |
| Montreal, Canada (sks. 20c ext.) | —— | 1.90a |
| New Orleans, La. | —— | 2.40 |
| New York, N. Y. | —— | 2.25@2.65† |
| Peoria, Ill. | —— | 2.37 |
| Philadelphia, Penn. | —— | 2.41@2.81† |
| Phoenix, Ariz. | .82½ | 3.65 |
| Pittsburgh, Penn. | —— | 2.19 |
| Portland, Ore. | —— | 3.05 |
| San Francisco, Cal. | .65¾ | 2.61* |
| St. Louis, Mo. | .55 | 2.20 |
| St. Paul, Minn. | —— | 2.42 |
| Seattle, Wash. (10c bbl. dis.) | —— | 2.65 |
| Toledo, Ohio | —— | 2.45 |

NOTE—Add 40c per bbl. for bags.
*5c cash disc 10 days.
†Prices to contractors, including bags.
(a) Less 10c 20 days.

Mill prices f.o.b. in carload lots, without bags, to contractors.

| | Per Bag | Per Bbl. |
|---|---|---|
| Buffington, Ind. | —— | 1.95 |
| Concrete, Wash. | —— | 2.60 |
| Dallas, Texas | —— | 2.05 |
| Fordwick, Va. | —— | 2.05 |
| Hannibal, Mo. | —— | 2.05 |
| Hudson, N. Y. | —— | 2.05 |
| Kingsport, Tenn. | —— | 2.05 |
| Leeds, Ala. | —— | 1.95 |
| Louisville, Ky. | .64¼ | 2.45 |
| Northampton, Penn. | —— | 1.95 |
| Steelton, Minn. | —— | 2.00 |
| Universal, Penn. | —— | 1.95 |

## Cement Products

Hawthorne tile, carload lots, f. o. b. plant.

| | Cicero, Ill. Per sq. | Ft. Worth, Tex. Per sq. |
|---|---|---|
| Silver gray | —— | 8.00 |
| Red French | 9.00 | 9.00 |
| Green French | 11.00 | 10.00 |
| Red Spanish | 12.00 | 9.00 |
| Green Spanish | 14.00 | 10.00 |

| | —Cicero— Red | Green | —Ft. Worth— Gray | Red | Green |
|---|---|---|---|---|---|
| Ridges | .25 | .35 | .25 | .25 | .30 |
| Hips | .20 | .30 | .14 | .14 | .17 |
| Ridge closers | .05 | .06 | .06 | .06 | .06 |
| Hip terminals, 2 way | 1.25 | 1.50 | 1.00* | 1.00* | 1.25* |
| Hip starters | .50 | .60 | .22 | .22 | .25 |
| Gable finials | 1.25 | 1.50 | 1.00 | 1.00 | 1.25 |
| Gable starters | .20 | .30 | .14 | .14 | .16 |
| End bands | .20 | .30 | —— | —— | —— |
| Eave closers | .06 | .08 | .06 | .06 | .06 |

*3-way terminals.

## Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

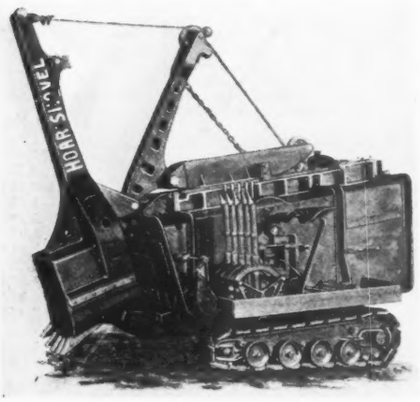
| | Crushed Rock | Ground Gypsum | Agricultural Gypsum | Stucco Calcined Gypsum | Cement and Gauging Plaster | Wood Fiber | White Gauging | Sanded Plaster | Keene's Cement | Trowel Finish | —Plaster Board— ¼x32x36" Weight 1500 lb. Per M Sq. Ft. | ⅜x32x36" Weight 1850 lb. Per M Sq. Ft. | Wallboard, ⅜x32 or 48" Lengths 6'-10', 1850 lb. Per M Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Agatite, Texas (a) | —— | —— | 6.00 | 10.00 | 10.00 | 10.50 | 10.00 | —— | 19.00 | —— | —— | —— | —— |
| Akron, N. Y. (a) | 3.00 | 4.00 | 6.00 | 10.00 | 10.00 | 10.00 | 20.20 | 7.00@9.00 | 27.35 | 21.00 | 19.375 | 20.00 | 30.00@32.00 |
| Blue Rapids, Kans. (a) | 2.50 | 4.00 | 6.00 | 10.00 | 10.00 | 10.50 | 10.00 | —— | 23.15 | 19.00 | 19.375 | 20.00 | —— |
| Douglas, Ariz. | —— | —— | 7.00 | —— | 16.50 | —— | 19.50 | —— | —— | 15.50 | —— | —— | —— |
| Ft. Dodge, Iowa (a) | 2.50 | 4.00 | 6.00 | 10.00 | 10.00 | 10.50 | 15.45 | —— | 22.70 | 20.00 | 19.375 | 20.00 | 30.00 |
| Grand Rapids, Mich. | 2.75* | 6.00† | 6.00† | 9.00‡ | 10.00‖ | 10.00‖ | —— | —— | —— | —— | —— | —— | —— |
| Gypsum, Ohio (a) | 2.75 | 4.00 | 6.00 | 10.00 | 10.00 | 10.00 | 19.25 | 7.50 | 26.85 | 19.00 | 19.375 | 20.00 | 30.00 |
| Hanover, Mont. | —— | —— | —— | 11.80 | —— | —— | —— | —— | —— | —— | —— | —— | —— |
| Port Clinton, Ohio | 3.00 | 4.00 | 6.00 | 8.00 | 9.00 | 9.00 | 21.00 | 7.00 | 30.00 | 20.00 | —— | 20.00 | 30.00 |
| Portland, Colo. | —— | —— | —— | 10.00 | —— | —— | —— | —— | —— | —— | —— | —— | —— |
| San Francisco, Calif. | —— | —— | 9.85 | —— | 14.40 | —— | 15.40 | —— | —— | —— | —— | —— | —— |
| Winnipeg, Man. | 5.50 | 5.50 | 7.00 | 13.50 | 15.00 | 15.00 | —— | —— | —— | —— | 28.50 | —— | 35.00 |

NOTE—Returnable Bags, 10c each; Paper Bags, 1.00 per ton extra (not returnable).
*To 3.25; †to 8.00; ‡to 11.00; ‖to 12; (a) prices are net of bags.

# New Machinery and Equipment

## New Gasoline-Electric Power Shovel

TO meet the demand for a full revolving power shovel of a size capable of being utilized in restricted quarters, and yet powerful enough to do general excavation and material handling work, the Hoar Shovel Co., Duluth, Minn., has brought out a new gasoline-electric full revolving shovel.




*Shovel in digging position*

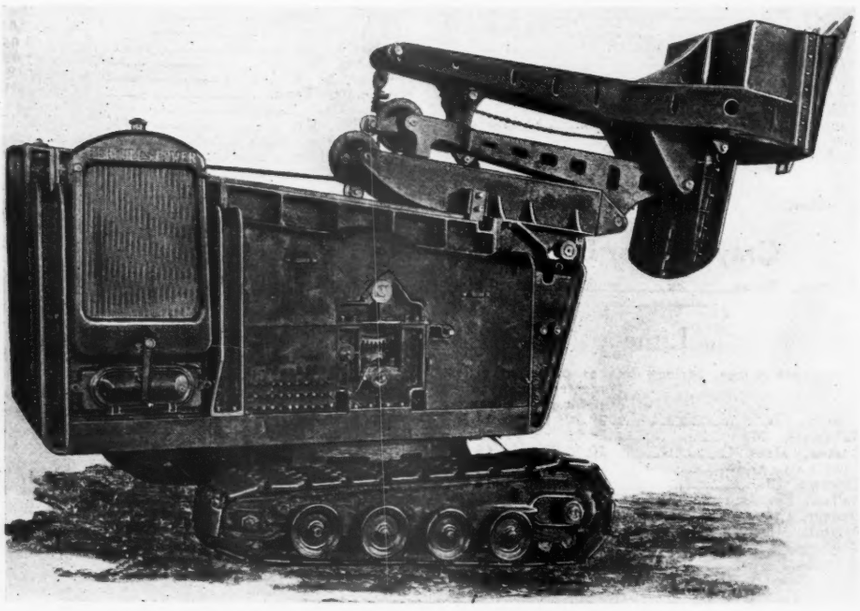
"Due to the compactness of the Hoar shovel, rapid operating speed is possible. Under average digging conditions, the shovel will complete three operating cycles per minute, each cycle consisting of digging, swinging, and dumping. Equipped with a 10 cu. ft. dipper, this gives an output of more than a yard a minute.

"The crowding action gives a direct thrust into the material to be handled, and when used in connection with the hoist, gives a 'rooting' motion which loosens the hardest material. The crowd is instantly reversible, full power being obtained in either direction.

"Hoisting gear is a flexible steel wire rope which, by its attachment to the upper end of the dipper stick, gives a leverage through the fulcrums on the dipper sticks, of two to one. Thus with the working line pull of 4500 lb., a pressure of 9000 lb. is obtained at the dipper lip. As the dipper lip is 30 in. wide, a pressure of 300 lb. to the lineal inch of dipper lip is developed. The front dipper plate is of cast manganese steel. Manganese steel dipper teeth, with reversible and renewable points, are used.

"The swinging turntable consists of a double ball-race, three hundred ⅞-in. hardened steel balls insuring free action and easy turning.

"Annealed steel castings are used throughout the shovel in its construction. Dipper stick and carriage are of special alloy steel, insuring maximum strength. No structural steel is used.



*Shovel discharging its load—Note panel with Alemite cups for lubrication*

"Mounted on crawler treads, independently driven, the shovel is easily manœuvred to any position, it being possible to turn the shovel completely in its own length and climb a steep grade. It will also dig itself in. The crawler shoes are special heat-treated alloy steel, connected with hardened pins which require no lubrication.

"Clutches are all of the cone type. A hydraulically pressed reinforced asbestos-graphite compound is used for friction blocks. The clutches are fully adjustable and easily accessible. Brakes on the clutches engage automatically when the operating levers are in neutral position.

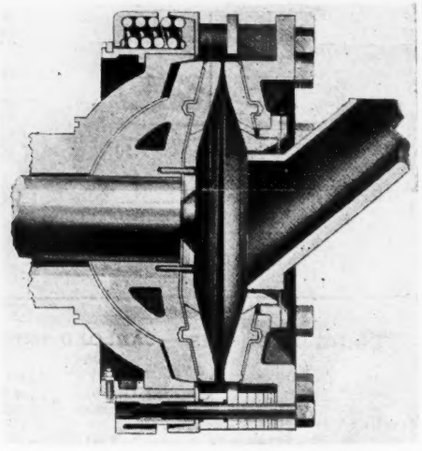
"Lubrication of bearings is obtained through the Alemite pressure system, the connections being brought to central panels for easy access. The bushings on operating shafts and levers are of the graphite-bronze self-lubricating type."

## Improvements on the Symons Disk Crusher

THE Symons Brothers Co., Milwaukee, Wis., has made some notable improvements recently in the design and construction of its disk crusher.

As now built, the crushing disks are fully interchangeable, one with another, either side. This eliminates the necessity of carrying extra spare parts and reduces the amount of scrap to be thrown away when the disk is worn out. Low scrap cost is one advantage claimed for the Symons disk crusher, as the disks wear true as long as they can be used, the manufacturer states.

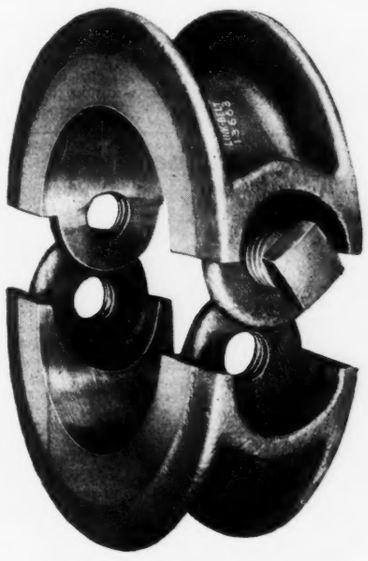
Another improvement is the new spring head which is provided with springs that are of sufficient strength to crush all crushable material, but with yielding means to allow non-crushable material to escape. This new head can be applied to crushers already in use. Oil waste has now been stopped on this machine, according to the manufacturer. There is a simple wiping device used on every bearing, which prevents oil getting away from its proper place.



*Improved spring head in Symons disk crusher*

## New Malleable Iron Safety Collar

IT is estimated that ten per cent of the power generated in the average industrial plant is wasted between the generator and the consuming machine. Attention to this loss of power has given rise to changes in power transmission equipment and the development of more efficient mechanical means.



***Malleable iron safety collar***

One of the most recent developments along this line comes from the Link-Belt Co. of Indianapolis, Ind., and is illustrated here. The manufacturer states that this new safety collar is intended to maintain the proper alignment of such equipment as pulleys, shaft bearings, hangers, etc.

It is claimed that great strength, toughness, durability, and light weight have all been incorporated in this new malleable iron safety collar, and in addition, a new design which permits the collar to be split in two pieces, thus affording ready and economical installation or adjustment. This type of collar, however, is made also in the solid ring type, both types being accurately machine finished, assuring a tight fit and a pleasing appearance.

The manufacturer claims that exhaustive tests made with the Link-Belt safety collar have proved it to be impervious to shocks and strains encountered in heavy-duty service. The material of which it is made possesses unusual wear and rust-resisting qualities. This extends its sphere of usefulness to installations where the atmospheric conditions contribute to rust or excessive abrasiveness. The setscrew, by which the collar is firmly affixed to the shaft, is flange protected.

This collar will be marketed through dealers located throughout the country, thereby assuring prompt service and shipment.

## Hydrotator Company Successor to L. C. Trent

THE Hydrotator Co., a newly-formed corporation, has acquired the patents and engineering business of L. C. Trent, who has been operating as the L. C. Trent Engineering Co. in Philadelphia.

Mr. Trent has retired from the business except for a limited territorial arrangement on the Pacific Coast.

Neither the Hydrotator Co. nor its predecessor, the L. C. Trent Engineering Co., is in any way affiliated with the Trent Process Corporation, the Trent Superfuel Co., or the Pittsburgh Trent Co., which produce so-called "Amalgam" from a mixture of oil and pulverized coal. The Trent patents purchased by the Hydrotator Co. cover entirely different processes, one of which deals with the cleaning of coal by classification and flotation.

Walter L. Remick, formerly engineering editor of the *Keystone Mining Catalogs,* will assume active management of the Hydrotator Co. after February 1. Mr. Remick is an engineer of wide and varied experience, especially along research lines.

Any problems involving dissolving of soluble constituents of minerals and discharge of insoluble constituents in a thickened state; separation of fine from coarse materials; washing of fine sizes, precipitating, agitating, filtering, thickening, classification and separation; in general, the treatment of any class of solids mixed with or in suspension in liquids will receive the prompt and careful attention of this organization, it announces.

The general offices of the company are at 1328 Chestnut street, Philadelphia, Penn.

## Unusual Application of Speed Reducers

THE EDITOR: I have read with interest the article in your December 27, 1924, issue on the Glens Falls Portland Cement Co. plant, particularly the description of the new type of slurry agitator designed and built by F. L. Smidth & Co. For the interest of your readers may I supplement the description referred to as follows:

"The power for running the agitation arms is supplied by a 10 hp. 570 r.p.m. General Electric motor operating through a Foote IXL spur-gear speed reducer, and the carriage is driven by a 5 hp. 570 r.p.m. motor through an IXL worm-gear speed reducer.

"This is the first installation of its kind used in an American cement mill and for this reason has attracted considerable interest. It also serves to demonstate graphically the compactness, safety and efficiency of enclosed speed reducing units for this kind of work. Obviously to secure the great speed reduction necessary for the paddle and carriage drive, by ordinary transmission methods, many belts, pulleys, chains and open gears would be required which would be dangerous, use up much valuable space and be subject to rapid deterioration from the dust, dirt and grit that would naturally accumulate.

"Other common uses for speed reducers in cement mills are for driving rotary kilns, slurry feeders, wash mills, agitators, drag chains, belt-bucket, drag and screw conveyors, elevators, grinders, mixers, coal dryers and crushers, dust conveyors, apron feeders and cement pumps."

Foote Bros. Gear and Machine Co.

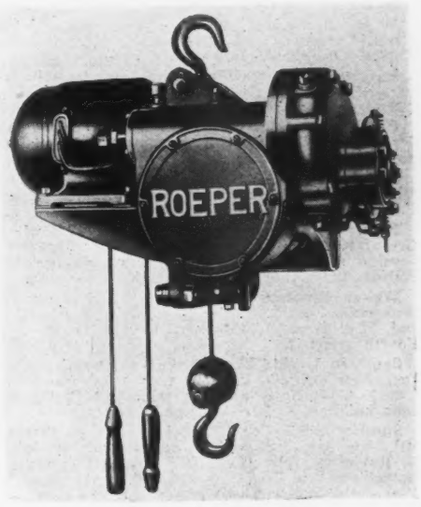
*By* F. A. EMMONS.

Chicago, Ill., Jan. 13, 1925.

## Electric Hoist

THE Roper Crane and Hoist Works, Reading, Penn., has recently developed a new small electric hoist that will complete the company's range of electric hoists from 500 lb. to 20,000 lb. capacity.

The manufacturer states that this hoist was designed to meet the need of small capacity, high-speed electric hoists, in places where the slow moving, strength exhausting chain blocks no longer measure up to the requirements for high production.




***Small electric hoist***

An automatic stop of the trip lever type, that is positive in its action, affords protection in extreme lifting and lowering. This stop can be adjusted for any distance of hook travel.

While the illustration shows a balanced hoist for hook suspension, it can also be furnished with either plain or geared I-beam trolleys with roller bearing wheels. Provision is also made for direct connection of hoists to any standard trolley for flat rail or special track.

Hoists of 500 lb., 1,000 lb., and 2,000 lb. capacities are furnished with single strand of hoisting cable of the non-twisting type.

# News of All the Industry

## Incorporations

**Bronx River Sand and Gravel Corp.**, Bronx, N. Y., has been incorporated.

**National Sand and Gravel Co.**, Trenton, N. J., has been incorporated for $50,000 by Julia Steward.

**Five Oaks Lime and Stone Co.**, Tazewell, Va., has been incorporated for $50,000. N. W. McConnell, president; H. A. Brown, secretary.

**High Grade Lime Co.**, has been incorporated under the laws of Delaware for $150,000. (U. S. Corporation Co.)

**Portage Stone Co.**, Portage, Wis., has been incorporated for $25,000 by John M. Flynn, Ann Borst, and Carrie E. Olsen.

**Shawnee Stone Co.**, has been incorporated under the laws of Delaware for $100,000 to operate a quarry. (Corporation Trust Co. of America.)

**Casparis Pennsylvania Quarries Co.**, Columbus, Ohio, has been incorporated for $100,000 by E. T. Walker.

**Yosemite Portland Cement Corp.**, has been incorporated under the laws of Delaware for $1,750,000 to manufacture and deal in portland cement.

**Wyoming Valley Cement Products Co.**, Wilkes-Barre, Penn., has been incorporated for $6,000 by Vincezo Pierdoinici.

**Farmers Marl Lime Co.**, Salem, Va., has been incorporated for $50,000. P. P. Saul, Jr., president and E. H. Saul, secretary.

**Manistique Lime and Stone Co.**, Manistique, Mich., has been incorporated for $25,000, to deal in lime, stone, cement, and other building material.

**Harlan Limestone Co.**, Harlan, Ky., has been incorporated for $30,000 by A. D. Miller, J. B. Snyder, and S. B. Bruner.

**Wenonah Cement Products Co.**, 428 Market street, Camden, N. J., has been incorporated for $200,000 to manufacture cement products.

**Pacific Lime and Cement Corp.** has been incorporated under the laws of Delaware for $20,000,000 to deal in cement of every kind.

**Calaveras Cement Co.** has been incorporated under the laws of Delaware for $14,000,000. (Corporation Trust Co. of America.)

**Jackson Pike Sand and Gravel Co.**, Columbus, Ohio, has been incorporated for $100,000 by James F. Baird and V. S. Julian.

**Edmondson County Land Co.**, Box 374, Bowling Green, Ky., has been incorporated for $75,000 to develop 500 acres of rock asphalt. George W. Wilson, President; George Carruthers, secretary.

**Walton Concrete Co.**, New York City, has been incorporated for $5,000 by R. Epstein, R. Manson, and E. Ellison. (Attorney, C. E. Benoit, 294 Fourth avenue.)

**Southern Uvalde Rock Asphalt Contracting Co., Inc.**, New Orleans, La., has been incorporated for $50,000. W. S. Behrman, president, 1012 Carondelet building, and N. W. Bond, secretary.

**Superior Block Co.**, 1218 John street, Baltimore, Md., has been incorporated for $50,000 by John D. Robinson, John Durazzo, and others to manufacture concrete blocks.

**River Sand and Gravel Co.**, North Chattanooga, Tenn., has been incorporated for $100,000 by Floyd L. Best, Leland Thompson, Morris Sherman, M. V. Wilson, and E. C. Moses.

**Greenville Rock and Sand Co.**, Greenville, S. C., has been incorporated for $10,000 to operate stone and rock quarries. H. C. Mims, president; W. D. Kendrick, secretary.

**Oxford Sand and Gravel Corp.**, Syracuse, N. Y., has been incorporated for $50,000 by W. L. Sporberg, A. G. Seitz, and M. D. Windsor. (Attorneys, Nash, Britcher and Eckel, Syracuse.)

**National Rock Products Co.**, Roscoe, Calif., formerly known as the National Rock and Gravel Co., has been incorporated for $150,000 and will enlarge the plant and install equipment to handle 900 tons a day.

**Cosgrove Stone Co.**, New York City, has been incorporated for $20,000 by T. P. and P. J. Cosgrove, and A. B. Fisher. (Attorneys, Wilson, Wagner and Cornell, 48 Wall street, New York City.)

**Stewart Sand and Gravel Corp.**, Binghamton, N. Y., has been incorporated for 1,500 shares preferred, $100 each, and 1500 common, no par value, by C. R. and M. R. Stewart H. J. Lamphe- (Attorneys, Stewart, Moody & Chamberlain, Binghamton.)

**Garfield Rock Asphalt Co.**, Louisville, Ky., has been incorporated for $250,000 and has just begun development of about 300 acres rock asphalt deposits, with a contemplated output of approximately 50,000 tons for 1925. Milton Board, secretary, 423 W. Jefferson street.

**Lansing Sand and Gravel Co.**, Comfort street, Lansing, Mich., has been incorporated for $75,000, to manufacture and deal in gravel, sand, and crushed stone. Officers and incorporators: Darrel D. Apple, president; Reynold C. Peez, vice-president; Harry F. Hittle, secretary-treasurer, and Roy E. Dean, director.

**Leaside Brick and Sand Co., Ltd.**, Toronto, Ontario, Canada, has been incorporated with a capital of $250,000 by C. D. Berg, 117 Wellington street, West, and others to manufacture and deal in building material. They have acquired a sand property at Leaside at the northeast of the city and in addition to dealing in sand will manufacture sand-lime brick.

## Sand and Gravel

**Neal Gravel Co.**, Indianapolis, Ind., has increased its capital from $100,000 to $150,000.

**Willawette Gravel Co.**, 291 E. Salmon street, Portland, Ore., has increased its capital stock to $65,000.

**M. H. Pengra** has sold his interest in the Independence Sand and Gravel Co., Independence, Ore., to C. G. Skinner.

**Sherman Sand and Gravel Co.**, Sherman, Calif., is a company formed by L. E. Slawter, Sherman, Calif., and G. L. Crumley, Los Angeles.

**Morgan Sand and Gravel Co., Inc., Brooklyn, N. Y.**, has increased its capital stock from $50,000 to $100,000.

**Lake Sand Corp.**, Chicago, Ill., has increased its stock from $150,000 to $350,000. Correspondent: Peden, Kahn & Murphy, City Hall Square building.

**Rhodes-Jamieson Co.**, Oakland, Calif., has purchased a 135-acre gravel property at Eliot, near Pleasanton, Calif., and will establish a gravel plant.

**Union Sand and Gravel Co.**, 20th and Riverfront streets, Huntington, W. Va., has acquired Raccoon Island (sand bar in the Ohio river), and will develop.

**Pasadena Rock and Sand Co.**, Lamanda Park, Calif., is the name of a company recently formed by C. L. Watson, 1739 N. Bronson avenue, Los Angeles, Calif., and Jack Mason, Lamanda Park.

**Oklahoma Material Co.** has secured a 160-acre tract of land one and one-fourth miles south of Dover near the Rock Island lines to develop a sand plant. A $25,000 corporation has been organized for the development of the sand in that vicinity and active producing of sand for the market was expected to start December 15. The plant is said to have a capacity for from 10 to 16 carloads of sand a day. The sand is suitable for the construction of hard-surfaced roads and bridges. Officials: A. J. Mahoney, president; F. C. Magruder, vice-president, and J. H. Mahoney, Jr., secretary-treasurer.

rock crushing plant on a tract of land already acquired lying east of Doling Park.

**Sunlight Crushed Stone Co.**, Madisonville, Ky., is planning improvements to its plant to cost about $25,000. John C. Regan is superintendent.

**Holston Quarry Co.** of South Carolina, Knoxville, Tenn., Box 292, has a quarry at Liberty, S. C., with daily output of 2000 tons.

**Atlas Portland Cement Plaster Co.**, Watonga, Okla., has acquired 689 acres in sections Nos. 22 and 27 and will install a rock crushing plant. It is reported that construction has begun. Office, Independence, Kan.

## Quarries

**Sparta Limestone Quarries, Inc.**, Sparta, Ill., has been purchased by the Sparta State Bank.

**Globe, Ariz.**—Prospecting of limestone deposits indicates the opening of a large quarry here.

**Fred Garrett and C. O. Sperry**, 308 E. Commercial street, Springfield, Mo., are organizing a company with a capital of $100,000, to install a

**Standard Paving Co.**, Tulsa Okla., is operating a large stone crushing plant a little way above Lost City, which is several miles outside of Tulsa, and it has designed and is adding to this plant, an asphalt filler plant. The company has purchased from the Kennedy-Van Saun Manufacturing and Engineering Corp., of New York, a six foot by eight foot air swept tube mill. The intention is to pulverize the screenings which are ⅜-in. and finer, to a material 85% of which will pass through a 200-mesh screen. This mill will have a capacity of from five to ten tons per hour, and this should be a very good thing for the city of Tulsa as there is no other asphalt filler plant in the vicinity. W. W. Berden is chief engineer.

## Cement

**Wabash Portland Cement Co.**, Ford building, Detroit, Mich., has awarded contract for a cement plant at Osborn, Ohio. Machine shops will be included.

**Petoskey Portland Cement Co.**, Petoskey, Mich., is arranging for enlargements and the installation of additional equipment to double, approximately, the present capacity. John A. Galster is secretary and treasurer in charge.

**Missouri Portland Cement Co.**, St. Louis, Mo., H. L. Block, president, advises, according to reports received: "The present improvements to the plant is the installation of two or more kilns, increasing production of wet process cement to a minimum of 6000 bbl. per day; increased capital from $6,000,000 to $9,000,000."

**Louisville Cement Co.**, Louisville, Ky., with mills at Speeds, Ind., which distributes through its subsidiary the J. B. Speed Co., at Louisville, has secured a building permit for a new $20,000 warehouse building at Garden street, where it will have both steam and electrical line connections. The company brings its cement into Louisville by interurban from the Indiana producing plant.

**Southland Portland Cement Co.**, Volunteer Life building, Chattanooga, Tenn., has acquired 9000 acres in Cumberland country, vicinity of Crab Orchard, Tenn., as a site for a new mill, estimated to cost $1,200,000. Work on the first unit will be completed before the other two are built. James O. Parker, president; Oscar Mather, Volunteer Life Insurance Co., Chattanooga, treasurer.

**Marquette Cement Mfg. Co.**, 140 South Dearborn street, Chicago, Ill., is planning a construction and improvement program at its mill at Cape Girardeau, Mo., to consist of buildings and equipment for about 50% increase in output. It will include a new kiln and accessory equipment, waste heat boilers and additional turbine in the power house. F. S. Richards is plant superintendent.

**Madison, Wis.**—According to reports, cement for highway construction work in Wisconsin this year will cost the state about 2 cents a barrel less than last year. The saving is said to be due to action by four Illinois companies in cutting their mimimum price 5 cents a barrel, reducing the general average for the state about 2 cents a barrel. The commission contracted for 465,000 bbl. this year from eight different companies.

**Crescent Portland Cement Co.**, recently placed a contract with the Westinghouse Electric and Manufacturing Co. for plant equipment for the purpose of modernizing the present plant at Crescentvale, Penn. Increased production has necessitated additional power facilities to take care of the increased load. The equipment consists of two 3000-Kw., 2200-volt, 3-phase, 60-cycle turbine generator units equipped with surface condensers and auxiliaries. In addition, the contract calls for a switchboard substation and six 500 Kv-a. transformers.

## Cement Products

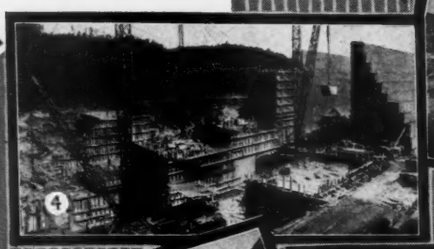
**Cristoffel Concrete Products Co.**, factory in Cedarburg, Wis., has been damaged by fire to the extent of $20,000, it is reported.

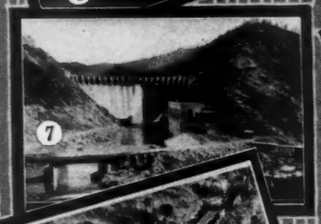
**Inglewood Concrete Tile Co.**, 1107 Redondo boulevard, Inglewood, Calif., is a company recently formed by Harold Swenson.

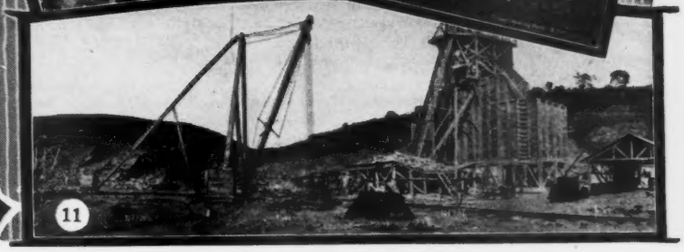
**Premier Cement Products Co.**, Lankershim, Calif., is a company recently formed by L. M. Clouse, D. E. Graham, and C. A. Waite.

**Shearman Concrete Pipe Co.**, Burwell building, Knoxville, Tenn., is reported to be contemplating establishing a plant at Bluefield, W. Va.

# Some Notable Achievements of Engineering History







***Large Dams, Irrigation Projects, etc.***

***In which Allis-Chalmers Engineering Service and Equipment have been Important Factors***

1. Quebec Development Co., Isle Maligne Development. Complete rock crushing plant. Allis-Chalmers hydraulic turbines developing 540,000 H. P. are also being installed.
2. Roosevelt Dam, Elephant Butte, Arizona. Complete cement plant.
3. Ebro Dam, Barcelona, Spain. Crushing and cement plant.
4. Locks and Dam No. 17, Black Warrior River, Alabama, U. S. Government. Complete crushing plant.
5. Barberine Dam — Switzerland. Crushing, washing and screening plant.
6. Naval Dry Docks, Toulon, France. French Government. Crushing plant complete with motor drive.
7-8. Cheoah and Badin Dams and power plants, Yadkin River. Tallassee Power Co. In addition to the crushing plants used in construction, Allis-Chalmers hydro-electric units are installed in power plants.
9-10. Southern California Edison Co. Allis-Chalmers crushing equipment used in the construction of five large development projects as well as hydraulic and electrical machinery in several power plants.
11. Reservoir Dams, Government of Brazil. Rock crushing and cement grinding plants.

Arrow Rock Dam, near Boise, Idaho.
Panama Canal, Panama. Crushing plant at Colon.
Wilson Dam, Muscle Shoals, Tennessee River.
Lookout Shoals Development, near Catawba, N. C. Southern Power Co.
Tallulah Falls, Tallulah, Georgia. Georgia Railway and Power Co.
Goat Rock Development, Chattahoochee River, near Columbus, Ga. Columbus Power Co.

***Let Allis-Chalmers Engineers Serve You.***

# ALLIS-CHALMERS

## MILWAUKEE, WIS. U.S.A.

*When writing advertisers, please mention ROCK PRODUCTS*

**A. P. Pool & Sons,** Meridian, Miss., plan the construction of a concrete brick manufacturing plant with a daily capacity of 12,000 brick, and expect later to increase the capacity to 50,000.

**Atlantic Marble and Tile Co.,** 203 S. Poplar street, Charlotte, N. C., is to put in a plant for the manufacture of tile and building blocks from marble chips.

**A. P. Pool & Son., contractors, Meridian, Miss., is reported to be contemplating building a concrete brick manufacturing plant, with an initial capacity of 12,000 brick daily to be probably increased to 50,000 daily.**

**Baltimore Concrete Products Co.,** Carter Benson, manager, Kate avenue and Western Maryland railway, Baltimore, Md., is reported to be erecting a plant addition, 32x80 ft., probably to use for storage.

**Solidite Products Co.,** St. Petersburg, Fla., has acquired about 150 acres at Lake Wales, Fla., and contemplates the erection of a plant for the manufacture of special cement and concrete products, to cost about $130,000 with machinery. U. H. Clarke, president.

**G. E. Wilson,** contractor, Plant City, Fla., has just purchased the concrete block manufacturing business operated by the firm of Carey and Walter at the rear of their offices on West Haines street. It is stated that, Mr. Wilson will manufacture cement tile and brick, pier base and pier blocks, and will handle a complete line of building supplies.

## Lime

**Alabama Lime and Stone Corp.,** 1302-6 First avenue, Birmingham, Ala., recently organized, is completing plans for its proposed works in the vicinity of Calera, Ala. It will include a complete electric-operated crushing plant, stone products plant, carbide works, chemical and byproducts plant, estimated to cost $500,000 with machinery. The company has taken over the properties of the O'Neals Lime Works, Inc., in this district and those of the Calera Development Co. John H. Adams is president and general manager.

## Phosphate Rock

**Wanganui, New Zealand**—Reports state that preliminary plans are under way for the construction of a fertilizer plant near Wellington, estimated to cost $1,000,000 with machinery. The American Consulate, Wellington, has information regarding the project.

## Slag

**Emanuel Slag Co., Inc.,** Allentown, Penn., operating plants at Easton and Catasauqua, Penn., contemplates the establishment of a new plant between Allentown and Catasauqua.

## Personals

**E. C. de Villaverde,** metallurgist and bearing specialist, is now associated with the United American Metals Corp., Brooklyn, N. Y.

**O. L. Chapman** has joined the sales organization of the Scott Valve Manufacturing Co., Detroit, Mich. Mr. Chapman is widely known in the industrial field throughout the United States, and will devote his time to the application of valves to manufacturing plants and similar lines of industry.

**....G. W. Walters** has been appointed by the Traylor Engineering and Manufacturing Co., district manager of the northwestern territory with offices at 815 Alaska building, Seattle, Wash.

**E. J. Heimerdinger** of the Louisville Cement Co., was elected treasurer of the Louisville Purchasing Agents Association, at the organization meeting of the leading purchasing agents of Louisville at the Elks Club on Dec. 15.

**O. P. Hanchette,** welding engineer, has been added to the sales force of the Burke Electric Co.'s Cleveland office, 7829 Euclid avenue, which office is in charge of L. L. Myers. Mr. Hanchette will specialize on the sales of electric equipment.

**Fred M. Sackett,** Senator Elect, from Kentucky, has resigned from the Federal Reserve Board of the Louisville branch of the St. Louis division, as a result of his recent election as Senator, which would make it impossible for him to continue the connection.

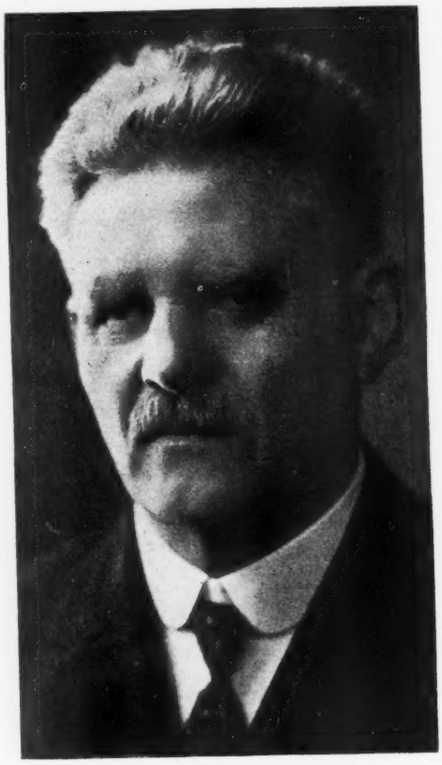
**W. H. Agens,** formerly district manager of the Traylor Engineering and Manufacturing Co.'s Seattle office, has been appointed district manager of the southwestern territory for the same company, with headquarters at the I. W. Hellman building, Los Angeles, Calif.

**A. C. Schultz,** chief engineer for the Kelley Island Lime and Transport Co., with headquarters at Cleveland, Ohio, resigned January 1. Mr. Schultz was connected with this company in various positions for 12 years during which he designed, constructed and reconstructed several of their largest plants, we are informed.

**Paul H. Creel,** who has been general manager of the J. B. Speed Co., selling agents at Louisville for the Louisville Cement Co., has been named secretary to Senator Fred M. Sackett, of the J. B. Speed Co., and Louisville Cement Co., who will be seated in the United States Senate in March. Mr. Creel started business with his father as a sugar broker, was associated with Mr. Sackett during the war period as assistant or secretary when Mr. Sackett was Food Administrator for Kentucky. After the war he became secretary to Mr. Sackett and later general manager of the J. B. Speed Co.

## Manufacturers

**Harnischfeger Corp.,** Milwaukee, Wis., is the name given to the company formerly known as the Pawling & Harnischfeger Co. The change of name, which was made in December, 1924, is, the company announces, merely a public acknowledgement of the debt which the organization owes to its president, Henry Harnischfeger. Mr. Harnischfeger with Alonzo Pawling, started a business 40 years ago in a small one-story building in Milwaukee with an engine lathe, drill-press, patternmaker's lathe, wood planer and a few other tools, all driven by a little 4x6 slide-valve steam engine. The company soon outgrew its small quarters and added another floor and a few years later a 3-story extension. The Edward P. Allis Co., (now the Allis-Chalmers Manufacturing Co.) placed A. J. Shaw in charge of the rebuilding of one of the rope-driven traveling cranes then in operation at its plant and Mr. Shaw conceived the idea of providing a separate electric motor for each motion,—hoisting, bridge travel, and trolley travel. It is said that this was the first 3-motor electric traveling crane ever built. The operation of the first crane was so successful that a company was organized by Mr. Pawling, Mr. Harnischfeger and A. J. Shaw under the name of the Shaw Electric Crane Co., with Henry Harnischfeger as president. From this time on, Pawling and Harnischfeger became permanently associated with the crane industry. In 1910, the partnership was incorporated under the name of "Pawling & Harnischfeger Co." In 1911, Mr. Harnischfeger purchased Mr. Pawling's interest in the business, Mr. Pawling then retiring to care for his private enterprises until his death in May 1914. The company gradually increased its line of equipment and proportionately the space required, adding the last link by the purchase of the Hercules Steel Castings plant in 1924, thus enabling the Harnischfeger Corporation to manufacture its products from the raw materials to the finished machine. The management administration and business policies remain the same as heretofore.



***Henry Harnischfeger, President, Harnischfeger Corporation***

**McMyler-Interstate Co.,** Cleveland, Ohio, announces the removal of its Detroit office from 1701 Washington boulevard building to 1156 Book building, February 1.

**C. O. Bartlett & Snow Co.,** Cleveland, Ohio, announces the removal of its plant on January 5 to 6200 Harvard avenue, where the company is better equipped to meet the demand of its steadily increasing business. Direct connections through the Cleveland Belt Line with all railroads entering the city will insure the rapid handling of orders.

**Williamsport Wire Rope Co.,** Williamsport, Penn., nounced the removal of its plant on January 5 to at Wortham, Texas. This branch will be under the general supervision of H. R. Gruber, manager of Oil Country sales whose offices and main distributing warehouse is at Tulsa, Okla., and under the direct supervision of E. A. MacKenzie.

**Foote Bros. Gear and Machine Co.,** Chicago, Ill., has recently completed arrangements with F. Somers Peterson Co., of San Francisco for distribution of IXL gear products and speed reducers in northern California and with the Thomas Machinery Co. of Los Angeles for the southern section. The Pacific Coast distributing organization now covers offices at Los Angeles, San Francisco, Seattle, Portland, and Vancouver, B. C.

## Obituaries

**S. A. D. Holford,** Denver, Colo., pioneer cement manufacturer, died at his home in Denver recently of influenza and complications due to old age.

**Glenn Grenville Howe,** for many years senior vice-president of the Link-Belt Co., passed away December 25, at his home in Muskegon, Mich., after a long illness. His first connection with the Link-Belt organization was as a 16-year old office boy in 1877. Following his mechanical bent he drifted into the manufacturing department, and later became superintendent of the Ewart Manufacturing Co. He knew the chain business thoroughly in practice and theory, and his connection with it was marked by several important improvements. When the Ewart Manufacturing Co., the Link-Belt Machinery Co., and the Link-Belt Engineering Co., were merged into one as the Link-Belt Co., in 1906, Mr. Howe became vice-president, in charge of the company's Indianapolis operations. Under his direction the Belmont Malleable Iron Foundry and Ewart assembly plant were built, in 1913; and he continued as senior vice-president until failing health led to his retirement from active business. Later, with returning health, he organized the Howe Chain Co., at Muskegon, Mich., serving as president. About the end of 1923 Mr. Howe was stricken with the illness which finally resulted in his death. The sale of the Howe Chain Co. to the Link-Belt Co. was made in January, 1924, and the Muskegon plant is now operated as the Howe Chain Plant of the Link-Belt Co., specializing in chain manufacture.

## Trade Literature

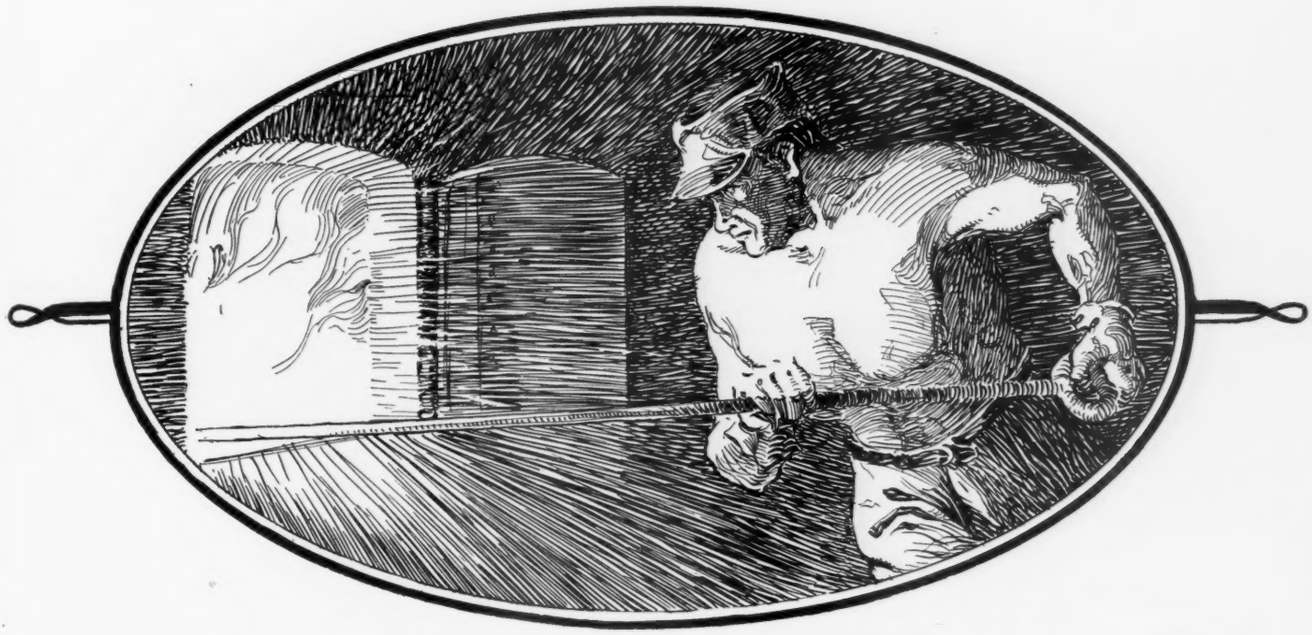
**Conveyors Corporation of America,** 326 West Madison street, Chicago, Ill. Bulletin describing and illustrating the American high-duty conveyor, equipment of the steam jet type for handling ashes from power houses or plants where machinery with large capacity is necessary.

**American Blower Co.,** Detroit, Mich. Bulletin 1218 describing and illustrating the "Venturafin" unit heaters. Tables of general dimensions and capacities and prices, are included. Direct-fired heaters are also described in a small folder entitled, "Heat Without Steam."

**Westinghouse Electric and Manufacturing Co.,** East Pittsburgh, Penn. Special Publication 1717, entitled, "The Engineering Achievements of the Westinghouse Electric company in 1924, which, as the title implies, is a record of many of the major achievements of Westinghouse engineers during the year.

**Barber-Greene Co.,** Aurora, Ill. "Contracting with Barber-Greenes" is the title of the latest booklet issued by this company which shows mainly road work, but also the application of this company's equipment to its various fields, in which is included a page of illustrations of loaders and conveyors at work in a sand and gravel pit.

**J. W. Paxon Co.,** Philadelphia, Penn., is distributing a mailing piece describing and illustrating the company's cloth screen dust collector for use in plants where the air is dust laden. The company states that this device not only removes 98% of the fine powder and dust from the air, but it also salvages this material, eliminating one channel of waste.



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## *Contractors and Engineers*

Located as we are in the heart of Ohio's great lime producing center, we are constantly in touch with the latest and best developments in the industry we serve.

We specialize in the design and construction of modern lime calcining and hydrating plants and the plants we have engineered have demonstrated this efficiency and economy in actual operation.

"Arnold" Lime Kilns are superior to any other type in every essential point. The "Arnold" Lining can be installed in practically any steel shell and will increase tonnage from 40 to 60%.

The Weber Batch Type Lime Hydrator is a simple, compact, mechanically correct, economical and efficient machine that occupies but 58 sq. ft. of floor space and is capable of turning out 4 to 6 batches per hour.

*Located at*

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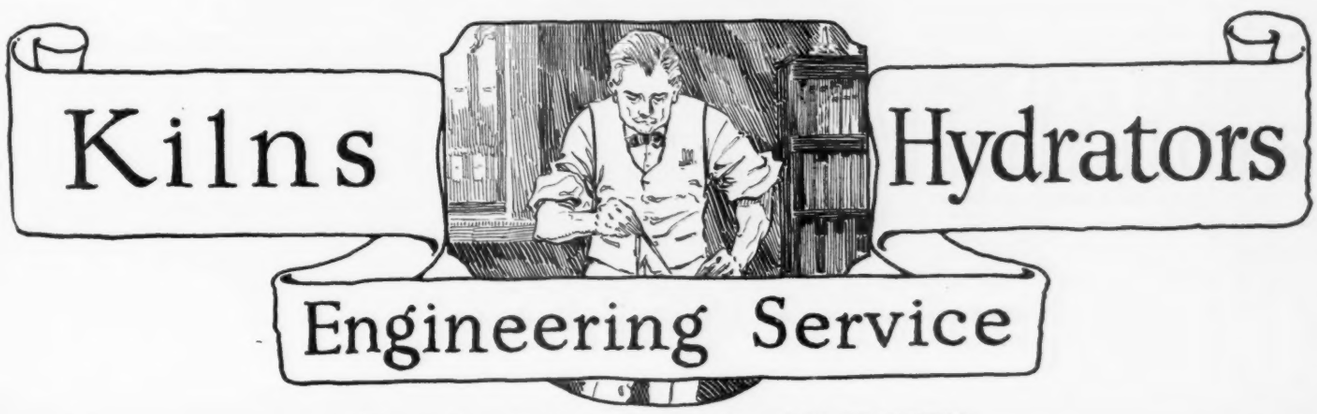
*"The Lime Center of the World"*




*When writing advertisers, please mention ROCK PRODUCTS*

**Sullivan Machinery Co.**, 122 So. Michigan avenue, Chicago, Ill., has just published Booklet 126, 8½x11 inches, 16 pages, entitled "You Can Do It Quicker With Air." This booklet shows 60 illustrations of rock drilling, concrete breaking, asphalt cutting, digging clay, riveting steel work, drilling wood and metal, sand blasting, spray painting, and other uses of compressed air, and features the Sullivan portable air compressors and air equipment used with them.

**Brown Instrument Co.**, Philadelphia, Penn. Catalog 32 describing and illustrating the company's $CO_2$ recording and indicating instruments, entitled, "Measuring $CO_2$ Electrically." This is a 16-page booklet well illustrated and prepared with much care. A phantom view of a cell unit is included with the parts numbered and named; and there is also an interesting diagram of an installation showing the relation between the various units, and accompanied with a description.

**Sullivan Machinery Co.**, Chicago, Ill. Bulletin 76-E on portable electric hoists. This bulletin describes the Sullivan single-drum and double-drum portable electric hoists of 6½ h.p., 2000 lb. vertical lifting capacity with single line. These hoists have rope capacity of 500 and 250 ft. of 5/16-in. wire rope respectively, and are modeled on the company's "Turbinair" compressed air hoists of similar types and are interchangeable in operation and in many particulars of construction and design.

**Foote Bros. Gear and Machine Co.**, Chicago, Ill., announces that it now has in course of preparation a new general catalog which will cover completely all its lines of industrial gears, machines, racks, sprockets, and spur and worm gear speed reducers. In addition it will contain a great deal of general engineering information, tables, formulas, and data which will make it valuable as a reference book. It is the aim of the company to make this book more interesting and instructive than the usual catalogue of this kind. Much time and effort is being put into compilation of the information, photographs and data and it will probably be several months before it will be ready for distribution.

**W. A. Jones Foundry and Machine Co.**, 4401 Roosevelt Road, Chicago, Ill., has recently issued its general Catalog 30 which is really a handbook on the line of machinery and tools manufactured by this company. It contains 448 pages, including an index for ready reference, and is bound in a neat hard cover. No time or effort has been spared in compiling this catalog. It is divided into sections as follows: (1) gears and speed reducers; (2) spur and worm-gear speed reducers; (3) pulleys; (4) friction clutches; (5) power transmission machinery; (6) sprocket wheels and chain belting; and (7) miscellaneous appliances. Each division is dealt with in detail and contains many tables of specifications. A number of halftone illustrations are included and some typical installations are given. Those interested in receiving a copy of the book, may obtain one by writing to the company.

**Leather Belting Exchange**, 119 So. 4th street, Philadelphia, Penn., has recently issued the following publications: a 24-page non-technical summary of research on the applications of leather belting by R. F. Jones, research director, covering a large number of experiments by The Leather Belting Exchange Foundation at its laboratory at Cornell University, on pulley diameters, pulley ratios, center distances, effect of high belt speeds, and the gravity idler, from which Mr. Jones is said to have developed new rating curves for leather belting, providing the necessary correction factors with their values. "Stopping the Leaks in Power Transmission and Utilization," by Terrell Croft, reprinted from "Industry Illustrated." This is a 20-page paper dealing with the measurement of power losses in transmission; a description of the apparatus required for such measurement and its use; and the proper application of the individual motor and the group belt drive. Both publications may be obtained free by writing to the Leather Belting Exchange, Louis W. Arny, secretary.

## Cost of Canadian Rural Roads

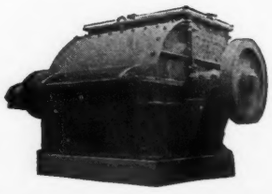
DURING the 10 years ending with 1923, the province of Ontario, its counties and its townships have spent more than $150,000,000 on rural highways. In the past five years more than $100,000,000 was spent as follows: By the townships, $20,000,000; counties on approved roads, $22,500,000; province, $75,000,000. Total, $117,500,000. When the expenditure for the year 1924 is added, this will probably exceed $140,000,000 for six years.

## U. S. Gypsum Company's New Lime Plant Progressing

CONSTRUCTION now going on in the upper end of Port Byron township, Ill., will bring the completion of a $200,000 lime kiln and hydrating plant there next summer. The United States Gypsum company of Chicago, which operates about twenty lime and gypsum plants all over the country plans to employ about 200 men at this place, and to produce there 200 tons of finished lime daily.

The building was begun in November, and will be completed and placed in use some time next summer, probably in August. No delays are being permitted in the work, the concrete and other construction continuing even through zero temperatures.

Of the lime burners which have operated in and around Port Byron for the last 60 years, the largest is the Port Byron Lime association's plant in the village.—*Rock Island (Ill.) Argus.*

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